

# Title XII Report to Congress FY 2017

August 2018

This report is submitted to Congress pursuant to section 300 of Title XII of the Foreign Assistance Act of 1961, as amended.



### LETTER FROM THE ADMINISTRATOR

Since long before I took the helm of the U.S. Agency for International Development (USAID), I have believed that the purpose of foreign assistance should be ending its need to exist. We should be working to help our partners on their journeys to self-reliance as they move along the development continuum from traditional recipients of aid, to partners, to donors.

Title XII of the Foreign Assistance Act of 1961, as amended, offers us a critical tool in this effort. U.S. universities covered by Title XII bring a unique set of capacities and expertise to improve our work, particularly in the areas of food security and resilience.

Between Fiscal Year (FY) 2011 and 2017, USAID's global investments in higher-education institutions totaled over \$3.3 billion, 82 percent of which went to Title XII universities. In FY 2017 alone, USAID worked with over 252 Title XII higher-education institutions to help our partners foster critical skills necessary for self-sufficiency in key areas including health, education, and food security.

Our network of 24 Feed the Future Innovation Labs has played a crucial role in developing, adapting, and sharing innovative approaches and technologies that help poor communities combat hunger, poverty, and malnutrition. This network draws on the pre-eminence of America's world-class system of land-grant-universities and its legacy of agricultural innovation and ingenuity. These partnerships have trained thousands of people around the world, and have improved crop yields and varieties, which, in turn, has helped poor families grow and consume more-nutritious foods.

USAID is proud to invest in this network of domestic and international institutions to enhance our national security and economic prosperity, and to promote a path to self-reliance and resilience. Our work brings the best of U.S. ingenuity and expertise to help partners from countries and communities address challenges and capitalize on opportunities for greater prosperity, peace, and well-being, both abroad and here at home.

I look forward to continuing to work with Title XII institutions to solve the many challenges that face the world today, to move us closer to a world in which such foreign assistance is no longer necessary.

Sincerely,

Mark Green USAID Administrator

## TABLE OF CONTENTS

LETTER FROM THE ADMINISTRATOR	i
TABLE OF CONTENTS	ii
LIST OF TABLES AND FIGURES	ii
I. ENGAGEMENT WITH TITLE XII INSTITUTIONS BY THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)	1
II. SUMMARY OF ACTIVITIES OF THE BOARD FOR FOOD AND AGRICULTURAL DEVELOPMENT (BIFAD) IN FY 2017	8
III. BIFAD RESPONSE TO THE FY 2017 TITLE XII REPORT TO CONGRESS	9
IV. APPENDICES	11
Appendix 1: Fiscal Year 2017 Feed the Future Innovation Lab U.S. College and University Partne	ers 11
Appendix 2: Fiscal Year 2017 Feed the Future Innovation Lab Collaboration with International Hi Education Institutions	igher- 16
Appendix 3: Fiscal Year 2017 U.S. Universities with Direct Awards from the U.S. Agency for International Development	23
Appendix 4: Fiscal Year 2017 U.S. Universities Working with USAID, by State	29

### LIST OF TABLES AND FIGURES

Table 1: Summary of USAID's Investments in Higher-Education Institutions Worldwide

Table 2: BIFAD's Public Events, Engagement, and Outreach in Fiscal Year (FY) 2017

Figure 1: Geographic Distribution of USAID's Funding to Foreign Universities

Figure 2: Distribution of USAID's Obligations to U.S. Higher-Education Institutions during FY 2017 by Sector

Figure 3: FY 2017 Distribution of USAID's Funding of U.S. Higher-Education Institutions in Health, Economic Growth and the Environment, and Education

Figure 4: Geographic Distribution of U.S. Universities that Work with USAID in International Development

Figure 5: Distribution of USAID-Funded, U.S.-Based, Long-Term Trainees, by Field

## I. ENGAGEMENT WITH TITLE XII INSTITUTIONS BY THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)

The Fiscal Year (FY) 2017 Title XII Report to Congress summarizes USAID's partnerships with U.S. higher-education institutions under Title XII of the Foreign Assistance Act of 1961, as amended (Public Law [P.L.] 87-195). The report focuses on the Agency's collaboration with its Title XII partners to address global-food security challenges through investments in agricultural research, education, and extension, as well as through related programs in nutrition, resilience, natural resources management, policy formulation, and trade.

#### Higher Education as an Engine of Innovation, Opportunity, and Global Development

USAID's global investments in higher-education institutions totaled over \$3.3 billion from FY 2011 through FY 2017, 82 percent of which went to Title XII universities. Table 1 shows obligations to U.S., foreign, and Title XII institutions for FY 2017 and over the last seven Fiscal Years (FY 2011–FY 2017).

#### Table 1: Summary of USAID's Investments in Higher-Education Institutions Worldwide

Institutional Type	<b>FY 2017 Obligations</b> <sup>a</sup> (\$, in millions)	FY 2011–FY 2017 Obligations (\$, in millions)	Percent Change from FY 2016 to FY 2017
All Higher-Education Institutions (Foreign and U.S.)	520	3,338	+24
U.S. Higher-Education Institutions	405	2,754	+21
Foreign Higher-Education Institutions	115	494	+34
U.S. Title XII Institutions <sup>b</sup>	391	2,732	+19
U.S. Non-Title XII Institutions	14	112	+133

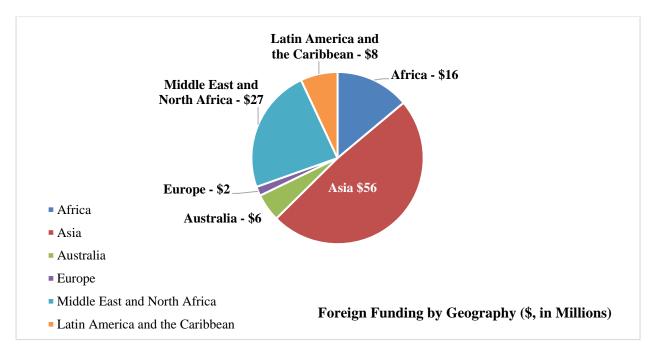
<sup>a</sup> All data contained in this report are based on financial obligations for direct awards to higher-education institutions, as well as a limited number of other organizations that make large subawards to such universities and provide support to U.S. higher education. <sup>b</sup> USAID uses an inclusive definition of a Title XII institution in alignment with the provisions of the *Famine* 

<sup>b</sup> USAID uses an inclusive definition of a Title XII institution in alignment with the provisions of the *Famine Prevention and Freedom from Hunger Improvement Act of 2000*, P.L. 106-373. This legislation broadened Title XII's purpose from preventing famine and establishing freedom from hunger to achieving "the mutual goals among nations of ensuring food security, human health, agricultural growth, trade expansion, and the wise and sustainable use of natural resources." "Title XII institutions", therefore, comprise: 1) those listed in the *First Morrill Act* (*1862*) or the *Second Morrill Act (1890)*; 2) those listed in the *Sea Grant College and Program Act (1966)*; 3) Native American land-grant colleges as authorized under the *Equity in Educational Land-Grant Status Act of 1994*; and 4) other U.S. colleges and universities that: a) have demonstrable capacity in teaching, research, and extension (including outreach) activities in the agricultural sciences; and b) can contribute effectively to the attainment of the objective of Title XII.

Source for all data: USAID Phoenix Financial Management System accessed on March 29, 2018. Figures are rounded to the nearest million.

#### Global Distribution of USAID's Investments at Higher-Education Institutions

USAID invests in higher-education institutions throughout the world. In keeping with the Agency's commitment to develop research and teaching capacity in partner countries as a step towards self-reliance, direct investments at foreign universities increased by 34 percent in FY 2017 as compared to FY 2016. In FY 2017, 75 percent of these obligations (\$390,730,305) went to Title XII universities, 22 percent (\$114,871,955) to universities outside the United States, and about three percent (\$14,173,572) to non-Title XII U.S. universities represented by stand-alone medical schools. Figure 1 illustrates the distribution of USAID's funding to universities outside the United States; most foreign universities that received direct funding from USAID worked with U.S. university collaborators.



**Figure 1**: **Geographic Distribution of USAID's Funding to Foreign Universities.** In FY 2017, a total of 51 institutions in 33 foreign countries received direct awards from USAID. Fifteen institutions in ten Asian countries (Afghanistan, Armenia, Bangladesh, India, Indonesia, Kyrgyz Republic, Nepal, Pakistan, Thailand, and Vietnam) received 49 percent of the Agency's funding to foreign universities. Six institutions in the Middle East and North Africa from four countries (Egypt, Israel, Jordan, and Lebanon) received 24 percent of the Agency's total funding to foreign universities. Thirteen universities in seven sub-Saharan African countries (Ethiopia, Ghana, Malawi, Rwanda, South Africa, Uganda, and Zambia) received 14 percent of the Agency's total foreign funding. In Latin America and the Caribbean, seven institutions in six countries (Colombia, Costa Rica, the Dominican Republic, Guatemala, Jamaica, and Peru) received seven percent of the Agency's total funding to foreign universities. Three Australian institutions received five percent. Seven institutions in six European countries (Bulgaria, England, Greece, Ireland, Kosovo, and Serbia) received two percent of the Agency's total funding to foreign universities.

Source: USAID Phoenix Financial Management System, as of March 29, 2018.

#### Distribution of USAID's Investments at U.S. Higher-Education Institutions

In FY 2017, USAID invested a total of \$404,903,877 in U.S. institutions of higher education. Of this total, the Agency awarded \$390,730,305 to Title XII institutions to implement activities across all development sectors. Moreover, U.S. universities received an additional \$50 million in sub-awards under

grants and contracts from private-sector entities and non-profit organizations, according to USA Spending, <u>https://www.usaspending.gov</u>. Figure 2 shows the distribution of these partnerships across all development sectors. Health, economic growth and the environment, and education are the sectors in which USAID invests the most with U.S. universities.

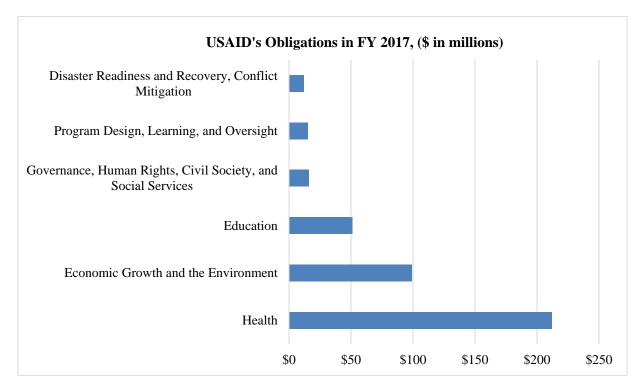
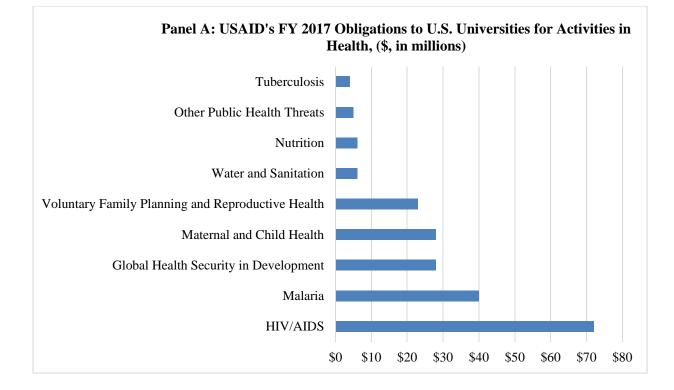
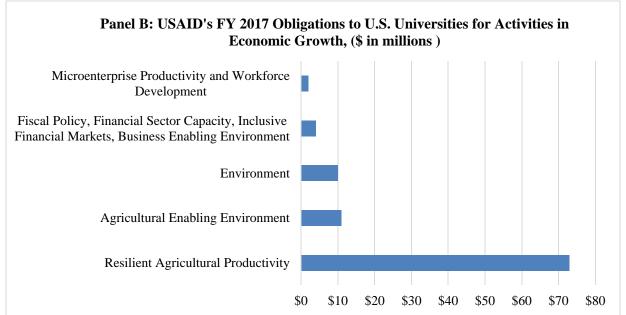
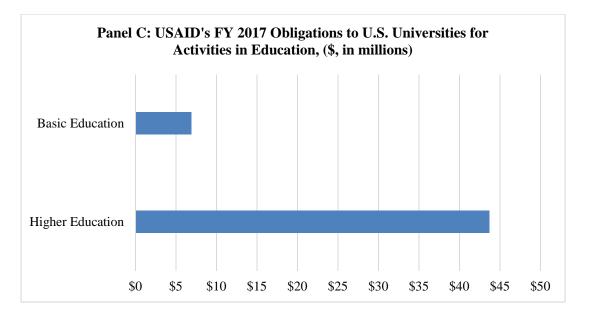


Figure 2: Distribution of USAID's Obligations to U.S. Higher-Education Institutions during FY 2017, by Sector. Source: USAID Phoenix Financial Management System, as of March 29, 2018.

Figure 3 presents a more-refined breakdown of USAID's funding within the three top sectors. To summarize, USAID's total funding in the health sector at U.S. higher-education institutions was \$212,358,663. Within nine health subsectors, the distribution was as follows (Panel A): HIV/AIDS (34 percent), malaria (19 percent), global health security in development (13 percent), maternal and child health (13 percent), voluntary family planning and reproductive health (11 percent), water and sanitation (3 percent), nutrition (3 percent), other public health threats (3 percent), and tuberculosis (2 percent). The Agency obligated a total of \$99,423,246 to U.S. universities for economic growth and environment activities, awarded in five primary areas (Panel B): resilient agricultural productivity (73 percent); the agricultural enabling environment (11 percent); the environment (10 percent); fiscal policy, financial sector capacity, inclusive financial markets, the business enabling environment (4 percent); and microenterprise productivity and workforce development (2 percent). Within the education sector, USAID distributed its total investment in U.S. universities of \$50,579,848 as follows (Panel C): higher education, including vocational training (87 percent) and basic education (13 percent).







## Figure 3: FY 2017 Distribution of USAID's Funding to U.S. Higher-Education Institutions in Health, Economic Growth and the Environment, and Education.

Source: USAID Phoenix Financial Management System, as of March 29, 2018.

Geographically, the number of U.S. universities involved in development activities with USAID spanned 50 states, plus the District of Columbia (five institutions) and Puerto Rico (two institutions). A minimum of 252 higher-education institutions received funding from and/or collaborated with USAID in FY 2017. The Feed the Future Innovation Labs tapped the expertise of 78 colleges and universities, 18 of which were Minority-Serving Institutions (MSIs). Fifteen different universities led the 24 Innovation Labs, two of which were MSIs. Moreover, 250 U.S. volunteers from the higher-education sector participated in a broad range of development activities through the John Ogonowski and Doug Bereuter Farmer-to-Farmer Program.



**Figure 4: Geographic Distribution of U.S. Universities that Work with USAID in International Development.** In FY 2017, at least 252 U.S. higher-education institutions implemented USAID programs in various capacities, including: 1) as recipients of either direct awards (all categories) from USAID or subawards from non-profit organizations, private-sector entities, or other universities under Feed the Future research programs, Human and Institutional Capacity Development programs, or the Higher Education Solutions Network (HESN); 2) as universities that participate in the Young African Leaders Initiative (YALI, either the Mandela Washington Fellowship, funded by the U.S. Department of State, or the Regional Leadership Centers, funded by USAID); 3) as U.S. mentor universities in the Partnerships for Enhanced Engagement in Research (PEER) program (PEER mentor universities do not receive direct funding, but collaborate with their host-country partners); 4) as providers of long- and short-term training experiences around the world; and 5) as sending institutions for volunteers under the John Ogonowski and Doug Bereuter Farmer-to-Farmer Program. Many U.S. higher-education institutions hold multiple awards or subawards.

Source: Phoenix Financial Management System, as of March 29, 2018; PEER Program; HESN Program; YALI Program; USA Spending; Internal USAID Data.

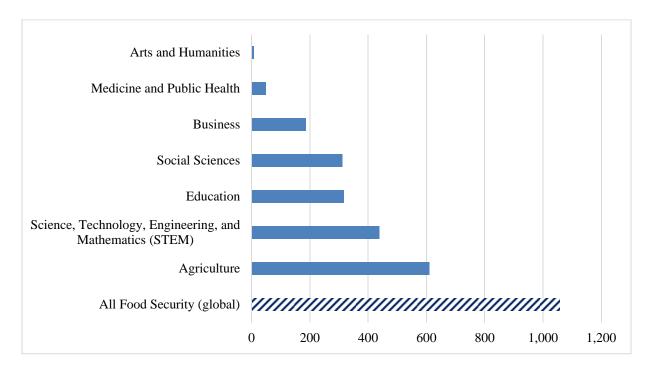
## Long- and Short-Term Training Provided by U.S. Higher-Education Institutions with Funding from USAID

USAID funds training opportunities to strengthen human capital around the world, develop local workforces, and build partnerships. In FY 2017, the Agency financed long-term training (defined as six months or longer) in a broad range of disciplines. A minimum of 1,922 individuals participated within the United States, and at least 444,000 individuals at locations around the world. Where partners reported sex-disaggregated data, approximately 48 percent of long-term trainees globally were female.

USAID funded a total of 1,057 degree candidates in disciplines related to food security, primarily at the Master's of Science (M.S.) and Doctoral (Ph.D.) levels. The 24 Feed the Future Innovation Labs provided graduate-degree training in food security to 811 individuals (42 percent female) from 48 countries, including the United States (13 percent). By region outside the United States, Africa represented the largest percentage of students (51 percent), followed by Asia (30 percent), and Latin America and the Caribbean (five percent). The Borlaug Higher Education for Agricultural Research and Development

(BHEARD) and the Borlaug Leadership Enhancement for Agricultural Productivity (LEAP) programs financed graduate training for an additional 246 students. Thirty-one percent of participants in these two programs were female, and 90 percent were from Africa; the remaining 10 percent were from Asia. Approximately 43 percent of BHEARD fellows studied in the United States in FY 2017, with the others at regional centers in Brazil, Ghana, Kenya, and India. Figure 5 shows the range of disciplines represented in the long-term trainings USAID supported in FY 2017.

The Feed the Future Innovation Labs provided short-term training to approximately 35,000 individuals at locations around the globe: Africa (57 percent), Asia (32 percent), Latin America and the Caribbean (eight percent), and the United States (three percent) in such topics as scientific methods, maintenance of equipment, application of pesticides, planting techniques, data collection, grant writing, financial management, entrepreneurship, and leadership. Where sex-disaggregated data were available for the short-term programs, 37 percent of attendees were female. In addition to short-term programs related to food security, USAID funded U.S. universities and other organizations to deliver training to over 2.3 million individuals worldwide across all development sectors.



**Figure 5: Distribution of USAID-Funded, U.S.-Based, Long-Term Trainees, by Field.** Agriculture was the largest field represented, with 610 students, followed by Science, Technology, Engineering, and Math, or STEM (439); education (316); social sciences (312); business (186); medicine and public health (49); and arts and humanities (eight). The hatched bar at the bottom represents USAID-funded graduate students (M.S. or Ph.D.), who were studying throughout the world, and includes the long-term trainees based in the United States.

Source: TraiNet System and internal data from the USAID Bureau for Food Security (BFS).

### II. SUMMARY OF ACTIVITIES OF THE BOARD FOR FOOD AND AGRICULTURAL DEVELOPMENT (BIFAD) IN FY 2017

BIFAD is a presidentially appointed, seven-member advisory body that includes at least four representatives from U.S. universities, with additional representation from the private sector and civil society. Section 298 of Title XII of the *Foreign Assistance Act of 1961*, as amended, authorizes BIFAD in recognition of the role that U.S. higher-education institutions play in agricultural development and ensuring food security, both domestically and abroad. USAID ensures that BIFAD's activities are carried out in compliance with *the Federal Advisory Committee Act of 1972*.

BIFAD members in FY 2017 included Brady J. Deaton, BIFAD Chair and Chancellor Emeritus of the University of Missouri; Waded Cruzado, President, Montana State University; Gebisa Ejeta, World Food Prize Laureate and Distinguished Professor of Agronomy, Purdue University; Harold L. Martin, Sr., Chancellor, North Carolina A&T State University; Cary Fowler, Former Executive Director, Global Crop Diversity Trust; James M. Ash, Food and Agribusiness Group Leader, Husch Blackwell LLP; and Pamela K. Anderson, Director-General Emerita, International Potato Center.

Date and Location	Event	Highlights
12 October 2016 Des Moines, Iowa	Public meeting: "Metrics for Accountability: Tracking Progress and Identifying Data Gaps in Development Investments" BIFAD Award for Scientific Excellence in a Feed the Future Innovation Lab	<ul> <li>Presented and discussed results frameworks, assumptions, evidence, and monitoring and evaluation systems as a basis for tracking progress and learning for adjusting investments towards achieving development goals.</li> <li>The senior researcher award went to Chris Barrett (Cornell University), Michael Carter (University of California, Davis) and Andrew Mude from the International Livestock Research Institute for their pioneering research on the causes and alleviation of chronic poverty.</li> <li>The graduate student award went to Daljit Singh (Kansas State University) for his work on improvements in wheat- breeding technologies.</li> </ul>
4–7 February 2017 Dakar, Senegal	BIFAD member Waded Cruzado participated in the West Africa Regional Meeting of the Innovation Lab Council Informal meeting of high-level stakeholders for Senegalese agricultural research and education systems	<ul> <li>Dr. Cruzado participated in research priority-setting discussions with partners of Feed the Future Innovation Labs with activities in West Africa.</li> <li>Dr. Cruzado participated in a high-level discussion on community-engaged higher-education and research as levers of economic growth in Senegal that included leaders of government Ministries, national research institutes, higher-education institutions, and the</li> </ul>

Table 2: BIFAD's Public Events, Engagements, and Outreach in FY 2017

Date and Location	Event	Highlights
		<ul> <li>private sector.</li> <li>The discussions informed USAID's investments in a national study of community-engaged higher education and support to operationalizing a new law on the subject.</li> </ul>
18–20 April 2017 Virtual on-line meeting	Public meeting: "Aligning Research Investments to the Global Food Security Strategy: A Three-Day AgExchange on Nutrition, Resilience, and Agriculture-Led Economic Growth"	<ul> <li>BIFAD members gave introductory remarks and facilitated on-line discussions to set research priorities across the areas of nutrition, resilience and agriculture-led economic growth.</li> <li>More than 400 individuals from over 20 countries participated.</li> <li>Research investments and scalability for application of research results were discussed.</li> </ul>
12 September 2017 Washington, D.C.	Public meeting: "U.S. Government's Global Food Security Research Strategy: From Upstream Research to Development Impact"	<ul> <li>USAID launched the new U.S. Government research strategy for global food security.</li> <li>Participants presented and characterized research and synergies among U.S. Government, universities, international research centers, and private sector enterprises.</li> </ul>

## III. BIFAD RESPONSE TO THE FY 2017 TITLE XII REPORT TO CONGRESS

BIFAD is pleased to comment on this Title XII Report to Congress for FY 2017. The Board commends USAID for establishing new avenues for working with universities to accomplish development goals while maintaining and strengthening its level of interaction with U.S. universities through a number of important traditional approaches described in the Report (particularly the Feed the Future Innovation Labs [Appendix 1]).

The Title XII Report to Congress for FY 2017 provides the level of detail on programmatic interactions with educational institutions necessary for BIFAD to comment. This level of detail will also help communicate to Congress clearly that the U.S. higher-education institution community is highly interested in being an effective partner with the Agency. There are U.S. higher-education institutions in all 50 states that participate in these efforts, and BIFAD considers this as evidence of a national effort.

BIFAD notes the increase in funding for work with U.S. and Title XII universities, as highlighted in Table 1. USAID's effort to leverage the capabilities of minority-serving institutions is highlighted in this Title XII Report, and this effort has been, and continues to be, of interest to BIFAD. Efforts have been undertaken by USAID to strengthen partnerships with other educational and research partners,

particularly private sector partners; the Board observed the results and benefits of these efforts in its public meetings.

BIFAD has a long history of supporting USAID's efforts in human and institutional capacity development, and it appreciates the information provided in this report concerning the level of activity in this area. BIFAD strongly supports efforts to increase access of international students to the graduate programs of our universities and continues to encourage USAID to seek ways to reduce and simplify the administrative requirements for such students' entry into, and residency in, the country.

BIFAD commends USAID for increasing funding for food and agricultural development and for augmenting involvement of U.S. universities in these development activities. BIFAD thanks USAID for the excellent efforts and the opportunity to help strengthen U.S. university participation in the noble goals of helping foster food security worldwide.

## **IV. APPENDICES**

Appendix 1: Fiscal Year 2017 Feed the Future Innovation Lab U.S. College and University
Partners

Feed the Future Innovation	Lead University	Collaborating U.S. Partners
Lab		
Applied Wheat Genomics Aquaculture and Fisheries	Kansas State University Oregon State University	Cornell University Alabama A&M University Auburn University North Carolina State University Purdue University University of Arizona University of Arkansas, Pine Bluff University of Connecticut, Avery Point University of Hawai'i, Hilo University of Michigan University of Rhode Island Virginia Polytechnic Institute and State University
Assets and Market Access	University of California, Davis	Columbia University George Washington University Harvard University Michigan State University Montana State University New York University Ohio State University Stanford University Tufts University University of California, Berkeley University of California, San Diego University of Georgia University of Georgia University of Illinois <i>University of Maryland, College Park</i> University of Michigan University of Washington Yale University
Climate-Resilient Beans	Pennsylvania State University	Colorado State University Michigan State University North Carolina State University North Dakota State University University of Georgia University of Missouri University of Puerto Rico, Mayaguez
Climate-Resilient Chickpea	University of California, Davis	Florida International University University of Georgia University of Southern California
Climate-Resilient Cowpea	University of California, Riverside	None in United States

Feed the Future Innovation Lab	Lead University	Collaborating U.S. Partners
Climate-Resilient Millet	University of California, Davis	None in United States
<b>Climate-Resilient Sorghum</b>	University of Georgia	Kansas State University
<b>Climate-Resilient Wheat</b>	Washington State University	Kansas State University
Food Processing and Post-Harvest Handling	Purdue University	Iowa State University North Carolina A&T State University Purdue University San Diego State University
Food Security Policy	Michigan State University	None in U.S.
Genomics to Improve Poultry	University of California, Davis	Cornell University Iowa State University University of Delaware
Grain Legumes	Michigan State University	Cornell University George Mason University (Virginia) Iowa State University Kansas State University North Carolina State University North Dakota State University <i>University of California, Riverside</i> University of Georgia <i>University of Hawaii, Manoa</i> University of Hawaii, Manoa University of Illinois University of Nebraska, Lincoln University. of Nebraska, Panhandle Research and Extension Center <i>University of Puerto Rico, Mayaguez</i> Washington University School of Medicine (Missouri)
Horticulture	University of California, Davis	Kansas State University Massachusetts Institute of Technology Michigan State University North Carolina State University North Carolina A&T State University Ohio State University Pennsylvania State University Purdue University Rutgers University Texas A&M University Tuskegee University University of Florida University of Hawai'i, Manoa University of Wisconsin, Madison

Feed the Future Innovation Lab	Lead University	Collaborating U.S. Partners
Integrated Pest Management	Virginia Polytechnic Institute and State University	City College of New York Cornell University Louisiana State University North Carolina State University Pennsylvania State University Ohio State University University of California, Berkeley University of Minnesota <i>Virginia State University</i> Washington State University
Livestock Systems	University of Florida	Colorado State University Emory University Iowa State University Kansas State University Montana State University Texas A&M University Texas Tech University Tufts University University of California, Davis University of Georgia University of Tennessee
Nutrition	Tufts University	Columbia University Cornell University Harvard University John Hopkins University Michigan State University Purdue University <i>Tuskegee University</i> University of California, Davis University of Georgia University of Illinois University of Massachusetts, Amherst

Feed the Future Innovation Lab	Lead University	Collaborating U.S. Partners
Peanut Productivity and Mycotoxin Control	University of Georgia	Auburn University California Polytechnic State University Cornell University Mississippi State University New Mexico State University North Carolina State University Oklahoma State University Texas A&M University, Lubbock Texas Tech University Tufts University University of Connecticut University of Florida University of Georgia Virginia Polytechnic Institute and State University
Reduction of Post-Harvest Loss	Kansas State University	Fort Valley State University Oklahoma State University San Diego State University South Carolina State University University of Kentucky University of Illinois University of Nebraska, Lincoln
Rift Valley Fever Control in Agriculture	University of Texas, El Paso	Iowa State University Texas A&M University University of Texas Medical Branch, Galveston
Small-Scale Irrigation Sorghum and Millet	Texas A&M University Kansas State University	North Carolina A&T State University Cornell University Oklahoma State University Purdue University Texas A&M University, College Station Virginia Polytechnic Institute and State University West Texas A&M University
Soybean Value Chain Research	University of Illinois	Mississippi State University University of Georgia University of Maryland, Eastern Shore University of Missouri

Feed the Future Innovation Lab	Lead University	Collaborating U.S. Partners
Sustainable Intensification	Kansas State University	Columbia University
		Iowa State University
		Michigan State University
		North Carolina A&T State University
		Oakland University
		Pennsylvania State University
		Stanford University
		Texas A&M University
		Tufts University
		University of California, Davis
		University of Florida
		University of Illinois
		University of Maryland, College Park
		University of Tennessee
		University of Wisconsin, Madison

**NB:** "Partners" include subawardees, collaborators on a subaward and/or lead award, providers of training, and/or members of an advisory committee. Minority-Serving institutions, defined as Federally recognized institutions under Title IV of the *Higher Education Act* based on minority enrollment criteria, (*i.e.*, Historically Black Colleges and Universities [HBCUs], Hispanic-Serving Institutions [HSIs], Asian American and Native American Pacific Islander-Serving Institutions [AANAPISIs], American Indian and Alaska Native-Serving Institution [AIANSI], and Tribal Colleges and Universities [TCUs] appear highlighted in blue text, with bold italics.

## **Appendix 2: Fiscal Year 2017 Feed the Future Innovation Lab Collaboration with International Higher-Education Institutions**

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Applied Wheat Genomics	Kansas State University	India	TERI University Punjab Agricultural University
Aquaculture and Fisheries	Oregon State University	Bangladesh	Bangladesh Agricultural University Khulna University
		Cambodia	Patuakhali Science and Technology University Inland Fisheries Research and Development Institute Kampong Cham National School of Agriculture Royal University of Agriculture
		Ghana	Kwame Nkrumah University of Science and Technology
		Kenya	Egerton University Karatina University Kenyatta University University of Eldoret
		Nepal	Agriculture and Forestry University
		Tanzania	Sokoine University of Agriculture University of Dar Salaam
		Uganda Vietnam	Makerere University Can Tho University Nha Trang University
Assets and Market Access	University of California, Davis	England Haiti Israel Kenya Malawi	University of Leeds Université d'État d'Haïti Ben-Gurion University Maseno University Lilongwe University of Agriculture and Natural Resources
		Nepal Tanzania Uganda	Nepal School for Social Sciences and Humanities Sokoine University of Agriculture Makerere University
Climate-Resilient Beans	Pennsylvania State University	Honduras Malawi	Escuela Agrícola Panamericana Lilongwe University of Agriculture and Natural Resources

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Climate-Resilient Chickpea	University of California, Davis	Australia Canada Ethiopia	Curtin University University of Saskatchewan Addis Ababa University Haramaya University
		India	Hawassa University Banaras Hindu University Punjab Agricultural University University of Agricultural Sciences, Dharwad
		Russia	Peter the Great St. Petersburg Polytechnic University
		Turkey	Dicle University Harran University
Climate-Resilient Cowpea	University of California, Riverside	Burkina Faso	University of Ouagadougou
		Ghana	Kwame Nkrumah University of Science and Technology University of Development Studies University of Ghana West African Center for Crop Improvement
Climate-Resilient Millet	University of California, Davis	Ethiopia	Haramaya University Jimma University
Climate-Resilient Sorghum	University of Georgia	Australia Burkina Faso	University of Queensland University of Ouagadougou
		Ethiopia	Haramaya University Jimma University
		Ghana	West African Center for Crop Improvement
		Kenya	Egerton University Moi University
		Mali Nigeria South Africa	University of Bamako Usmanu Danfodiyo University University of KwaZulu-Natal University of the Western Cape
Climate-Resilient Wheat	Washington State University	India	Chaudhary Charan Singh Haryana Agricultural University Govind Ballabh Plant University of Agriculture and Technology Punjab Agricultural University Rajendra Agricultural University Swami Ram Teerath Marathwada University
		Pakistan	University of Agriculture Faisalabad

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Food Processing and Post-Harvest Handling	Purdue University	Kenya	Pwani University University of Eldoret
0		Senegal	Université Cheikh Anta Diop de Dakar
		South Africa	University of Thiès University of Pretoria
Food Security Policy	Michigan State	Nigeria	University of Ibadan
	University	Senegal	Université Cheikh Anta Diop de Dakar
		South Africa Tanzania	University of Pretoria
Genomics to Improve	University of	Australia	Sokoine University of Agriculture University of Sydney
Poultry	California, Davis	Ghana	University of Ghana
		Kenya Nigeria	University of Nairobi University of Nigeria
		Tanzania	Sokoine University of Agriculture
Grain Legumes	Michigan State University	Burkina Faso	University of Ouagadougou
	Oniversity	Finland	Tampere University
		Ghana	Kwame Nkrumah University of
			Science and Technology University of Development
			Studies
			West African Center for Crop
		Honduras	Improvement Escuela Agrícola Panamericana
		Malawi	Lilongwe University of
			Agriculture and Natural Resources
			University of Malawi College of Medicine
		Niger	University of Maradi
		Tanzania Uganda	Sokoine University of Agriculture Makerere University
		Zambia	University of Zambia

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Horticulture	University of	Bangladesh	Bangladesh Agriculture University
norneunure	California, Davis	Dunghuuton	Patuakhali University of
	Cumoniu, 2 u no		Technology
			Royal University of Agriculture
		Cambodia	University of Battambang
		Ghana	Methodist University College
		Guatemala	Universidad de San Carlos de
			Guatemala
		** 1	Universidad Rafael Landívar
		Honduras	Escuela Agrícola Panamericana
		India	Jayashakar Telangana State
		17	Agricultural University
		Kenya	Egerton University
			Moi University
			Mt. Kenya University
			University of Eastern Africa
		Nonal	University of Eldoret
		Nepal	Agriculture and Forestry University
		Rwanda	University of Rwanda
		Tajikistan	Tajik Agrarian University
		Thailand	Kasetsart University
		Uganda	Busitema University
		Zambia	University of Zambia
Integrated Pest	Virginia Polytechnic	Bangladesh	Bangabandhu Sheikh Mujibur
Management	Institute and State		Rahman Agricultural University
	University	Cambodia	Royal University of Agriculture
			University of Battambang
		Ethiopia	Addis Ababa University
			Ambo University
			Haramaya University
			Hawassa University
			Jimma University
		Japan	Nagoya University
		Kenya	Chuka University
			Jomo Kenyatta University
			University of Nairobi
		Nepal	Agriculture and Forestry
			University Trillerer University
		Couth A f.	Tribhuvan University
		South Africa	Tshwane University of
		Tanzania	Technology Sokoine University
		1 anzallia	Sokoine University University of Dar es Salaam
		Vietnam	Can Tho University
		victualii	Nong Lam University
			Vietnam National University of
			Agriculture
Livestock Systems	University of Florida	Cambodia	Royal University of Agriculture
LITESTOCK Systems	-	19	Logar entrendry of rightenture

Lead University	Country	International Institutions of Higher Education
	Ethiopia	University of Battambang Addis Ababa University Hawassa University
		Oda Bultum University Gondar University Mekelle University
	Nepal	Ethiopia Civil Service University Himalayan College of Agricultural Science & Technology
	Rwanda Sweden	Tribhuvan University University of Rwanda Swedish University of Agricultural
	Uganda	Sciences Makerere University
Tufts University	Bangladesh Cambodia England	University of Dhaka Royal University of Agriculture London School of Hygiene and Tropical Medicine University of London, Leverhulme Center for Integrated Research on Agriculture St. John's Medical College
	Indonesia Malawi	University of Jakarta Lilongwe University of Agriculture and Natural Resources University of Malawi, College of Medicine
	Mozambique	Universidade Eduardo Mondlane University of Lurio
	Nepal Norway South Africa Uganda	Tribhuvan University University of Bergen University of Cape Town Gulu University Makerere University
	Lead University Tufts University	Ethiopia Ethiopia Nepal Rwanda Sweden Uganda Bangladesh Cambodia England Indonesia Malawi Nozambique Nepal Norway South Africa

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Peanut Productivity	University of Georgia	Brazil	University of Brasilia
and Mycotoxin		Burkina	University of Ouagadougou
Control		Faso	
		Ghana	Kwame Nkrumah University of
			Science and Technology
			University of Development
			Studies
			University of Ghana
		India	Tamil Nadu Agriculture
			University
		Kenya	Kenyatta University
		Malawi	Lilongwe University of
			Agriculture and Natural Resources
			University of Malawi College of
			Medicine
		Mozambique	Universidade Eduardo Mondlane
		Thailand	Khon Kaen University
		Uganda	Gulu University
		Zambia	University of Zambia
<b>Reduction of Post-</b>	Kansas State University	Bangladesh	Bangladesh Agriculture University
Harvest Loss		Ethiopia	Bahir Dar University
		-	Hawassa University
			Mekelle University
		Ghana	Kwame Nkrumah University of
			Science and Technology
		Guatemala	Universidad del Valle de
			Guatemala
Rift Valley Fever Control in Agriculture	University of Texas, El Paso	Tanzania	Sokoine University of Agriculture
Small-Scale Irrigation	Texas A&M University	Ethiopia	Arba Minch University
Burrow		<b>r</b>	Bahir Dar University
		Ghana	University of Development Studies
		Tanzania	
		i alizallia	Sokoine University of Agriculture

Feed the Future Innovation Lab	Lead University	Country	International Institutions of Higher Education
Sorghum and Millet	Kansas State University	Burkina	University of Ouagadougou
		Faso	•• ••
		Ethiopia	Haramaya University
		Germany	Hawassa University University of Hohenheim
		Ghana	West African Center for Crop
			Improvement
		Haiti	Quisqueya University
		Mali	Université Privé de Ségou
		Niger	Université Abdou Moumouni de Niamey
			Université Dan Dicko Dankoulodo
			University of Maradi
		Senegal	University of Tahoua École National Supérieure
		Benegar	d'Agriculture de Thiès
			University of Thiès
			Université Cheikh Anta Diop de
		South Africa	Dakar
		Uganda	University of Pretoria
Soybean Value Chain	University of Illinois,	Ethiopia	Makerere University Jimma University
Research	Urbana-Champaign	Ghana	University of Developmental
	1 0		Studies
			West African Center for Crop
		M-1*	Improvement
		Malawi	Lilongwe University of Agriculture and Natural Resources
		South Africa	Stellenbosch University
		Uganda	Makerere University
Sustainable	Kansas State University	Bangladesh	Bangladesh Agriculture University
Intensification			Khulna University
		Burkina Faso	Polytechnic University of Bobo- Dioulasso
		raso Cambodia	Royal University of Agriculture
		Cumboulu	University of Battambang
		England	University of Essex
		Ethiopia	Bahir Dar University
		Netherlands	University of Twente
		Senegal	Wageningen University University of Gaston Berger of
		Bellegal	Saint Louis
			University of Thiès
		Tanzania	Sokoine University of Agriculture
		Thailand	Kasetsart University

**NB:** Collaboration includes receiving a subaward, collaboration on a subaward and/or lead award, participation on an advisory committee, and/or providing degree training.

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
AZ	Arizona State University	Middle East, Vietnam, Pakistan	Х		Х			
CA	University of California System	Worldwide, Jordan, Democratic Republic of Congo, West Africa, Pakistan, Guatemala, Afghanistan, Guinea, Rwanda	Х	Х	Х		Х	
CA	Santa Clara University	India		Х				
CA	Stanford University	Mexico		Х				
CO	University of Colorado	Worldwide	Х					
CT	Yale University	Worldwide	Х					
DC	George Washington University	Worldwide	Х					Х
DC	Georgetown University	Worldwide	Х	Х				
FL	Florida International University	Worldwide, Latin America and Caribbean		Х				Х
FL	Florida State University	Nigeria			Х			
FL	University of Florida	Worldwide		Х				
				23				

Appendix 3: Fiscal Year 2017 U.S. Universities with Direct Awards from the U.S. Agency for International Development

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
GA	University of Georgia	Worldwide		Х				Х
GA	Emory University	Worldwide, Georgia	Х			Х		
HI	University of Hawai'i System	Indonesia, Burma						Х
IL	University of Chicago	Egypt, India, Pakistan		Х		Х	Х	
IL	University of Illinois	Worldwide, Malawi		Х				
IN	Purdue University	Worldwide, Malawi		Х				Х
IN	University of Notre Dame Du Lac	Worldwide					Х	Х
KS	Kansas State University	Worldwide, Cambodia, Honduras, Nepal		Х			Х	
LA	Tulane University	South Africa	Х					
MA	Tufts University	Worldwide, Bangladesh, Ethiopia, Honduras, Malawi, Mozambique, Uganda, Yemen	Х	Х			Х	Х
MA	University of Massachusetts System	Rwanda				Х		
MA	Brandeis University	Worldwide	Х					

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
MA	Harvard University	Bangladesh, Mozambique	Х				Х	
MA	Massachusetts Institute of Technology	Worldwide, Near East, Uganda		Х	Х		Х	
MD	Johns Hopkins University	Worldwide, Angola, Democratic Republic of Congo, Nigeria, Mozambique, East Africa, Nepal, Guinea, Kenya, Liberia, Tanzania, Benin, Ghana, Zimbabwe, Zambia, Bangladesh, Pakistan, Malawi, Ethiopia, Mali, Swaziland, Côte d'Ivoire, Guyana, South Africa, Sierra Leone, China, Uganda	Х	Х	Х	Х	Х	
MD	University of Maryland	Worldwide					Х	
MI	Michigan State University	Worldwide, Tanzania, Burma, Nigeria, Malawi, Senegal, Mali, Haiti, Afghanistan, Bangladesh, Guatemala, Rwanda, Venezuela	Х	Х	Х		Х	
MN	Macalaster College	Worldwide	Х					
MN	University of Minnesota	Worldwide, Cambodia, Indonesia	Х	Х				

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
MO	University of Missouri	Worldwide		Х				_
NC	Duke University	Worldwide	Х					
NC	University of North Carolina, Chapel Hill	Worldwide, Kenya, Dominican Republic, Ukraine, Burundi, Central America, Mozambique, Ghana, Zambia, Democratic Republic of Congo, Guinea, Liberia, Mali, Senegal, Tanzania, South Africa, Haiti, Honduras, Uganda, Côte d'Ivoire, Botswana, Bangladesh, Madagascar, East Africa, Guatemala, Malawi	Х	Х			Х	
NV	University of Nevada	South Asia		Х				
NY	CUNY	Central America				Х		
NY	SUNY System	Worldwide, Kenya, Côte d'Ivoire, Bosnia-Herzegovina	Х	Х	Х	Х		
NY	Columbia University	Worldwide, Mozambique, Ethiopia	Х					
NY	New York University	Afghanistan			Х			
NY	Cornell University	Worldwide, Bangladesh		Х				

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
NY	Columbia University	Worldwide		Х				
OH	Ohio Northern University	Rwanda				Х		
OR	Oregon State University	Worldwide		Х				
PA	University of Pittsburgh	Worldwide	Х					
PA	Pennsylvania State University	Worldwide		Х				
RI	University of Rhode Island	Ghana, Senegal		Х				
TN	Vanderbilt University	El Salvador, Guatemala, Dominican Republic, Haiti, Jamaica, Peru, Latin America and the Caribbean, Mexico				Х	Х	
TN	University of Tennessee	Rwanda		Х				
ΤХ	Baylor College of Medicine	Tanzania, Swaziland, Lesotho, South Africa, Namibia	Х					
ΤX	Rice University	Worldwide, Malawi	Х					
ТХ	Texas A&M University	Worldwide, Central America, Africa		Х	Х		Х	
ТХ	University of Texas, El Paso	Worldwide		Х				
UT	University of Utah	Pakistan			Х			

State	University	Geography of Activities	Health	Economic Growth, Environment	Education	Governance Human Rights, Civil Society, and Social Services	Program Design, Learning, and Oversight	Disaster Readiness and Recovery, Conflict Mitigation
VA	College of William and Mary	Worldwide, Colombia, Ghana, Rwanda		Х	Х	Х	Х	-
VA	Eastern Virginia Medical School	Worldwide	Х					
VA	Virginia Polytechnic Institute and State University	Worldwide, Senegal, Armenia, Tanzania, Egypt		Х				
WA	University of Washington	Worldwide	Х	Х				

State	Universities
AK	University of Alaska, Fairbanks
AL	Alabama A&M University
AL	Auburn University
AL	Tuskegee University
AL	University of Alabama
AL	University of Alabama, Birmingham
AR	Arkansas State University
AR	Arkansas Technical University
AR	University of Arkansas
AR	University of Arkansas, Pine Bluff
AZ	Arizona State University
AZ	Northern Arizona University
AZ	University of Arizona
CA	California Polytechnic State University
CA	California State University, Monterey Bay
CA	California State University, East Bay
CA	California State University, Long Beach
CA	Golden Gate University
CA	Loma Linda University
CA	San Diego State University
CA	San Francisco State University
CA	Santa Clara University
CA	Skyline College
CA	Stanford University
CA	University of California, Berkeley
CA	University of California, Davis
CA	University of California, Irvine
CA	University of California, Los Angeles
CA	University of California, Riverside
CA	University of California, San Diego
CA	University of California, San Francisco
CA	University of California, Santa Barbara
CA	University of California, Santa Cruz
CA	University of San Diego
CA	University of Southern California
CO	Denver Colorado Seminary
CO	Colorado State University
CO	University of Colorado

Appendix 4: Fiscal Year 2017 U.S. Universities Working with USAID, by State

СО	University of Denver
CO	University of Northern Colorado
СТ	Bridgeport University
СТ	University of Connecticut, Storrs
СТ	University of Connecticut, Avery Point
СТ	University of New Haven
СТ	Yale University
DC	American University
DC	George Washington University
DC	Georgetown University
DC	Graduate School USA
DC	Howard University
DE	Goldey-Beacom College
DE	University of Delaware
FL	Embry-Riddle Aeronautical University
FL	Florida A&M University
FL	Florida Institute of Technology
FL	Florida International University
FL	Florida State University
FL	University of Central Florida
FL	University of Florida
FL	University of Miami
GA	Clark Atlanta University
GA	Emory University
GA	Fort Valley State University
GA	Georgia State University
GA	University of Georgia, Tifton
GA	University of Georgia
GA	University of Georgia, Griffin
HI	University of Hawai'i, Hilo
HI	University of Hawai'i, Manoa
IA	Dordt College
IA	Drake University
IA	Iowa State University
IA	University of Iowa
IA	University of Northern Iowa
ID	University of Idaho
IL	Eastern Illinois University
IL	Illinois Institute of Technology
IL	Joliet Junior College
IL	Loyola University Chicago

IL	Northern Illinois University
IL	Northwestern University
IL	University of Chicago
IL	University of Illinois
IL	University of Illinois, Chicago
IN	Indiana University
IN	Notre Dame University
IN	Purdue University
IN	Trine University
IN	University of Southern Indiana
IN	Valparaiso University
KS	Kansas State University
KS	University of Kansas
KY	Murray State University
KY	University of Kentucky
KY	Western Kentucky University
LA	Louisiana State University
LA	Tulane University
MA	Boston College
MA	Boston University
MA	Brandeis University
MA	Bridgewater State University
MA	Clark University
MA	Emerson College
MA	Harvard University
MA	Massachusetts College of Pharmacy and Health Sciences
MA	Massachusetts Institute of Technology
MA	Olin College
MA	Suffolk University
MA	Tufts University
MA	University of Massachusetts, Lowell
MA	University of Massachusetts, Amherst
MD	Johns Hopkins University
MD	Towson University
MD	University of Baltimore
MD	University of Maryland, Baltimore County
MD	University of Maryland, College Park
MD	University of Maryland, Eastern Shore
ME	University of Maine
MI	Eastern Michigan University
MI	Michigan State University

MI	Michigan Technological University
MI	Oakland University
MI	University of Michigan
MI	Wayne State University
MN	Macalaster College
MN	St. Cloud State University
MN	University of Minnesota
MO	Missouri State University
MO	University of Missouri
MO	Washington University
MO	Webster University
MS	Mississippi State University
MT	Montana State University
MT	University of Montana
NC	Appalachian State University
NC	Duke University
NC	North Carolina A&T State University
NC	North Carolina State University
NC	University of North Carolina, Chapel Hill
NC	University of North Carolina, Greensboro
NC	University of North Carolina, Wilmington
NC	Wake Forest University
ND	North Dakota State University
NE	Bellevue College
NE	University of Nebraska, Lincoln
NE	University of Nebraska, Panhandle Research and Extension Center
NH	Dartmouth College
NH	Southern New Hampshire University
NH	University of New Hampshire
NJ	Fairleigh Dickinson University
NJ	Montclair State University
NJ	Princeton University
NJ	Rutgers University
NJ	Seton Hall University
NM	New Mexico State University
NM	University of New Mexico
NV	University of Nevada, Reno
NY	Binghamton University
NY	City University Of New York
NY	Clarkson University
NY	Columbia University

NY	Cornell University
NY	New York Film Academy
NY	New York University
NY	Rensselaer Polytechnic Institute
NY	Rochester Institute of Technology
NY	Saint John's University
NY	State University of New York (SUNY) Albany
NY	State University of New York (SUNY) Fredonia
NY	State University of New York (SUNY) Plattsburgh
NY	State University of New York (SUNY) Buffalo
NY	State University of New York (SUNY) Cortland
NY	State University of New York (SUNY) Genesee Community College
NY	State University of New York (SUNY) Stony Brook
NY	Syracuse University
NY	The New School
NY	Union College
NY	University of Rochester
NY	Wagner College
OH	Baldwin Wallace University
OH	Bowling Green State University
OH	Case Western Reserve University
OH	Kent State University
OH	Miami University of Ohio
OH	Ohio Northern University
OH	Ohio State University
OH	Ohio University
OH	University of Akron
OH	University of Toledo
OH	Wright State University
OK	Oklahoma State University
OK	University of Oklahoma
OR	Oregon State University
OR	Willamette University
PA	Arcadia University
PA	Carnegie Mellon University
PA	Drexel University
PA	Duquesne University
PA	Eastern University
PA	Indiana University of Pennsylvania
PA	Lehigh University
PA	Pennsylvania State University

PA	University of Pennsylvania
PA	University of Pittsburgh
PR	University of Puerto Rico
PR	University of Puerto Rico, Mayaguez
RI	Brown University
RI	University of Rhode Island
RI	University of Rhode Island, Narragansett Bay
SC	South Carolina State University
SC	University of South Carolina
SD	South Dakota State University
TN	Middle Tennessee State University
TN	Tennessee State University
TN	Tennessee Technological University
TN	University of Memphis
TN	University of Tennessee
TN	Vanderbilt University
TX	Baylor University
TX	Rice University
TX	Texas A&M University, College Station
TX	Texas A&M University, Lubbock
TX	Texas Tech University
TX	University of Houston
TX	University of Texas, Galveston
TX	University of Texas, Arlington
TX	University of Texas, Austin
TX	University of Texas, Dallas
TX	University of Texas, El Paso
TX	University of Texas, San Antonio
TX	University of the Incarnate Word
TX	West Texas A&M University
UT	Brigham Young University
UT	University of Utah
VA	College of William and Mary
VA	Eastern Virginia Medical School
VA	George Mason University
VA	Northern Virginia Community College
VA	Old Dominion University
VA	University of Virginia
VA	Virginia Polytechnic Institute and State University
VA	Virginia State University
VT	University of Vermont

VT	Vermont Technical College
WA	Saint Martin's University
WA	University of Washington
WA	Washington State University
WI	Milwaukee School of Engineering
WI	University of Wisconsin, Madison
WV	West Virginia University
WY	University of Wyoming