



# Historically Black Colleges and Universities (HBCUs): NSF's Role in Building Capacity for STEM Education and Research

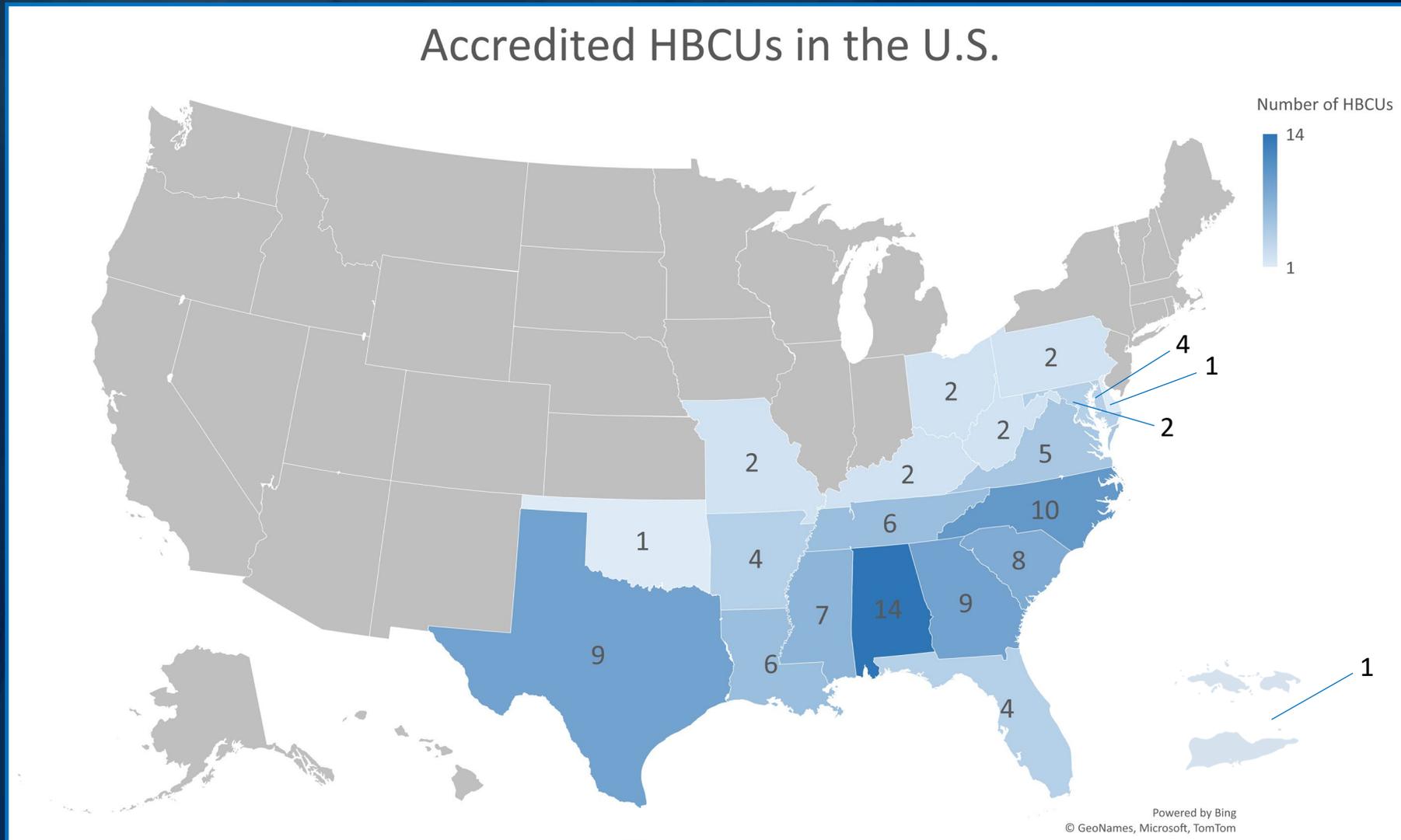
**Dr. Claudia Rankins**

Program Director

EHR/HRD

July 29, 2020

# About HBCUs



# About HBCUs



15 HBCUs have accredited engineering programs.



21 HBCUs offer a Ph.D. in at least one STEM discipline.



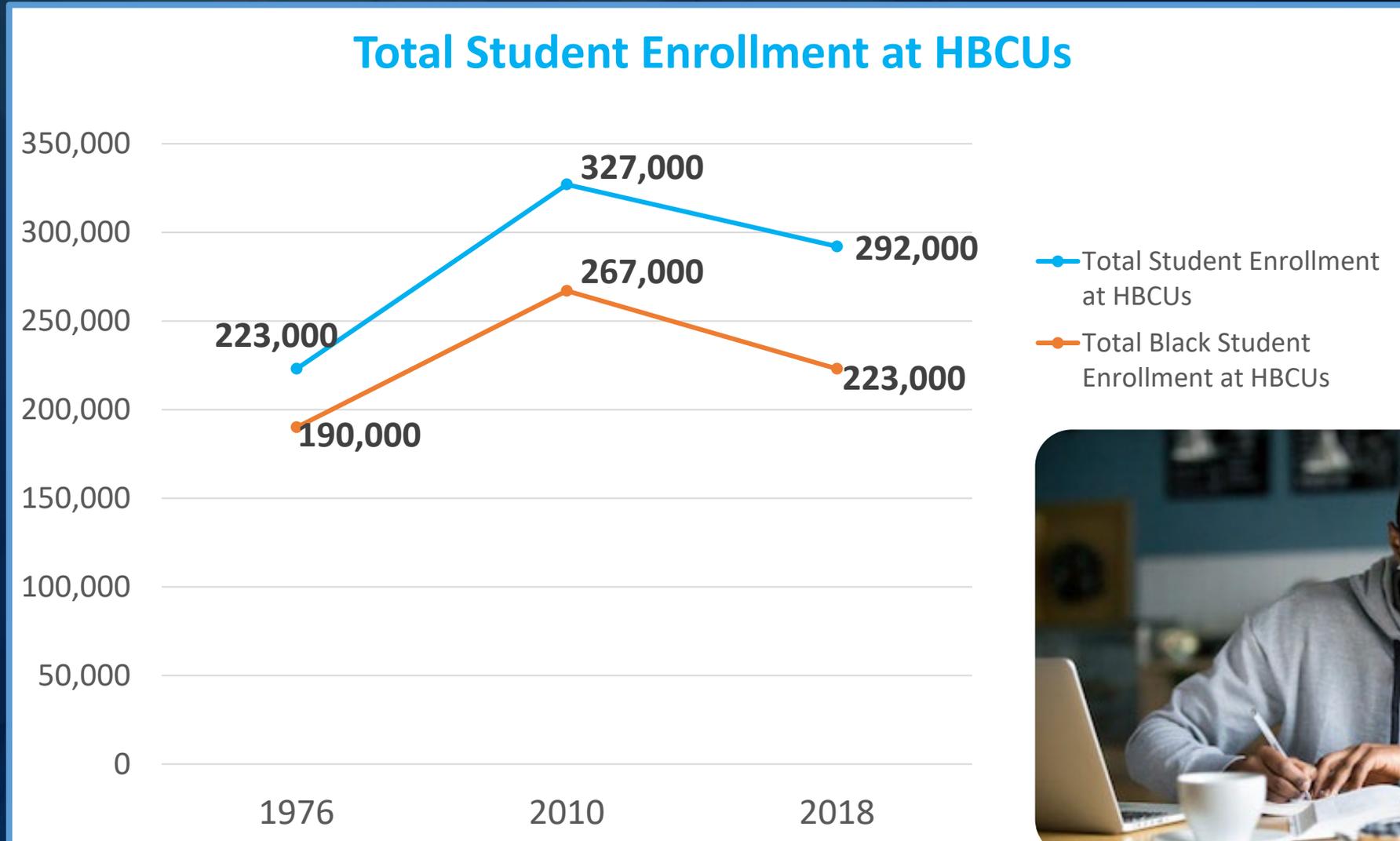
34 HBCUS conferred doctoral degrees and 58 conferred graduate degrees at the master's level.



90 HBCUs offer a bachelor's degree program and 42 of these offer associate degrees.



# About HBCUs

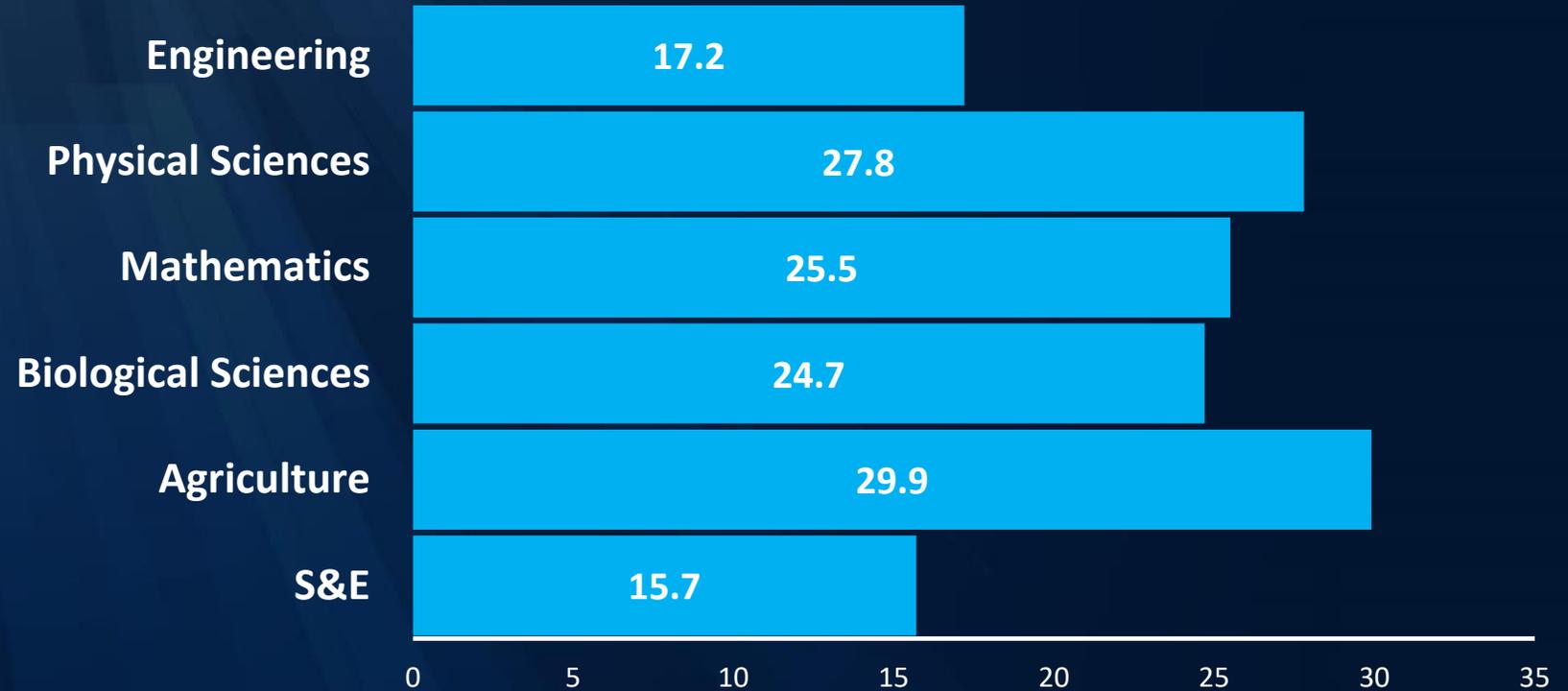


# About HBCUs



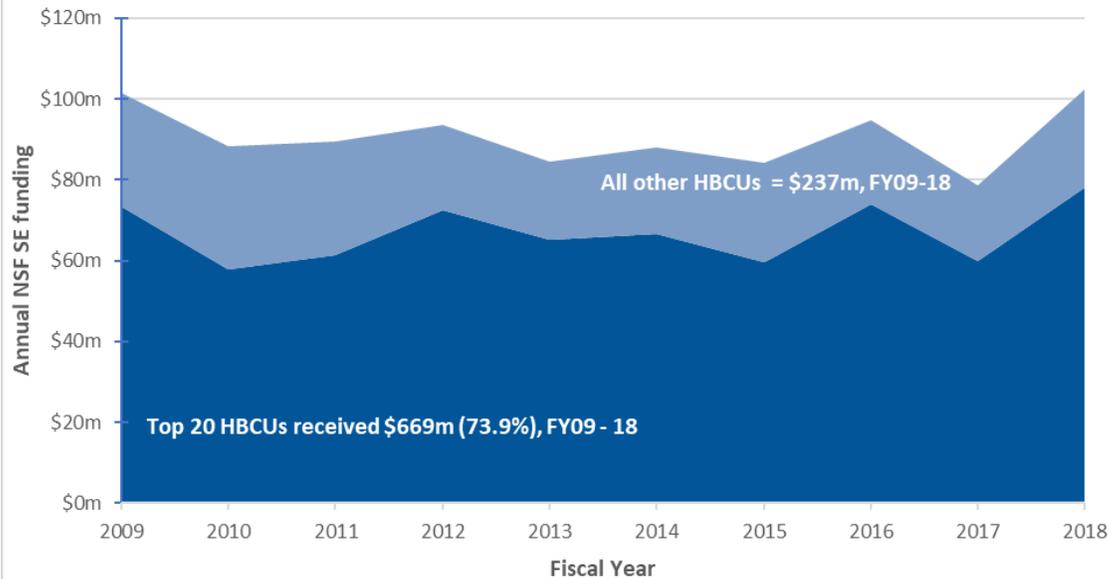
HBCUs enroll about 9% of Black undergraduate students overall.

Below is the percentage of Black undergraduate students receiving the B.S. degree in selected STEM disciplines from HBCUs

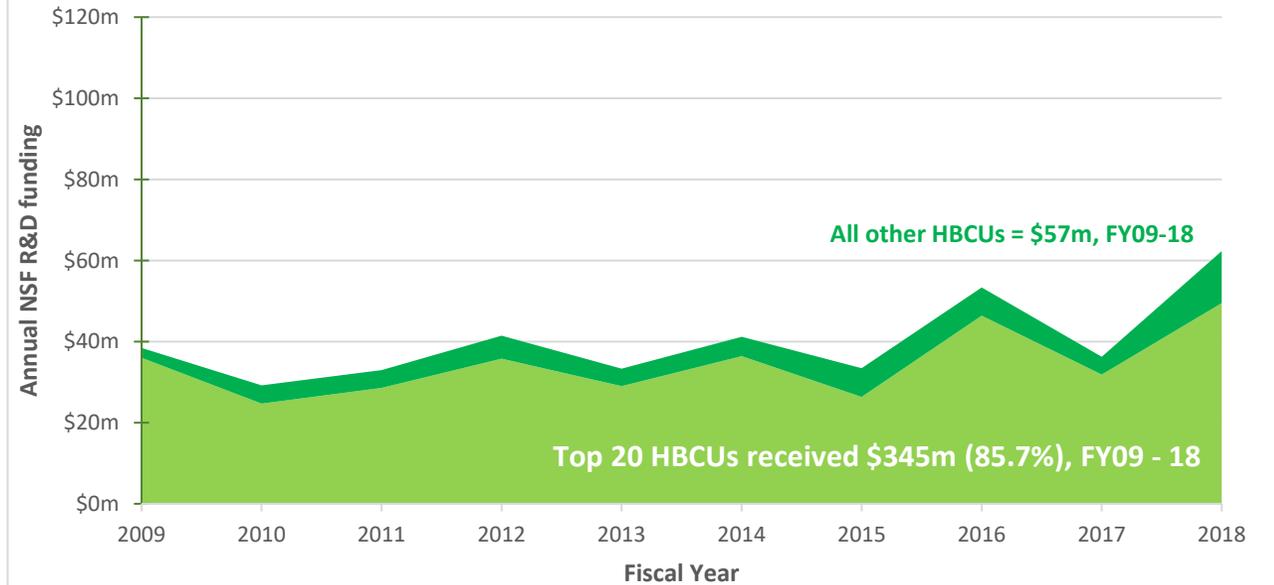


# NSF Funding Landscape of HBCUs

**NSF awarded \$905m in Science & Engineering funding to HBCUs, FY09-18**

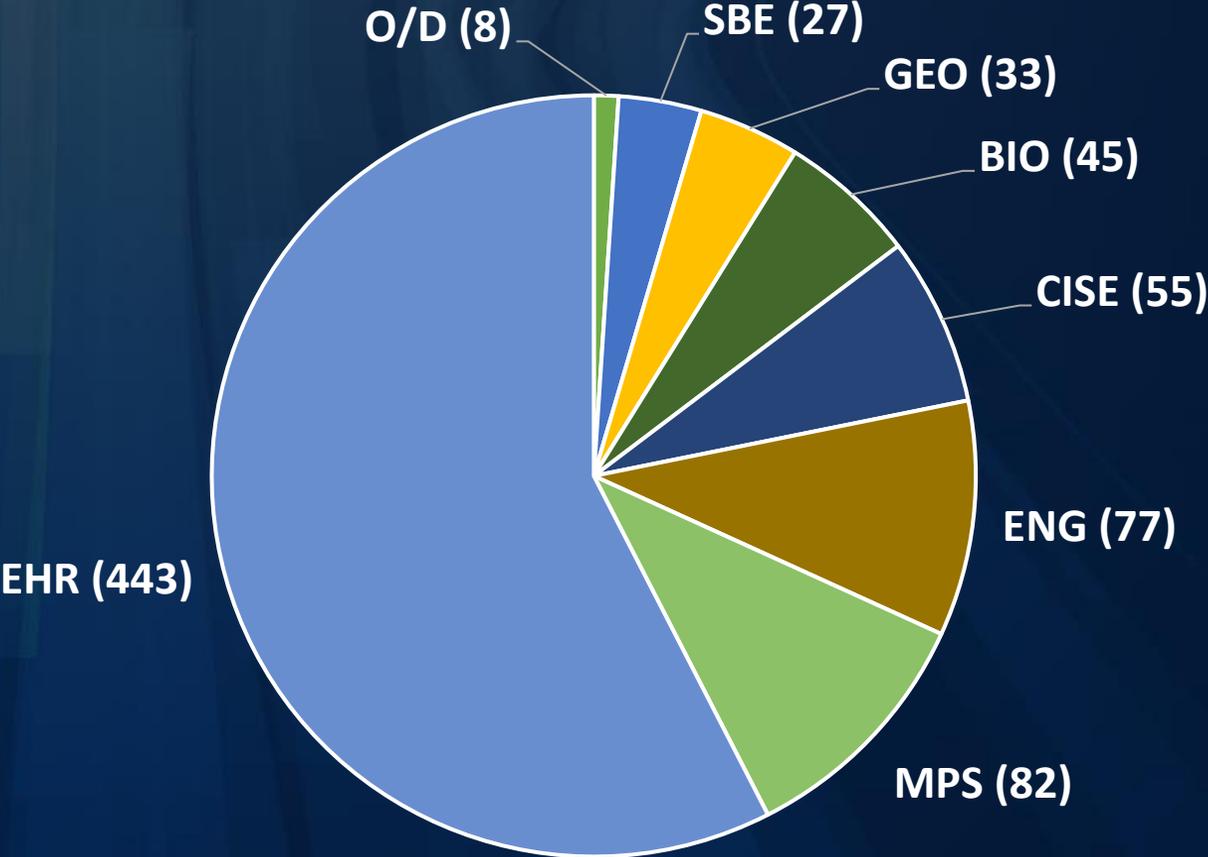


**NSF awarded \$402m in Research & Development funding to HBCUs, FY09-18**



# NSF Funding Landscape of HBCUs

NSF made 770 awards to HBCUs from FY15 - FY19; 58% were from EHR



# NSF Programs that Focus on HBCUs

- Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)
- Historically Black Colleges and Universities Research Infrastructure for Science and Engineering (HBCU-RISE)
  - Track under the Centers of Research Excellence in Science and Technology (CREST) program
- Historically Black Colleges and Universities – Excellence in Research (HBCU-EiR)



# HBCU Success Stories



## Harris Stowe State University 2008

Establishes biology and mathematics B.S. programs



## Florida A&M University 2012

Receives HBCU-UP Research Initiation Award



## University of Virgin Islands 2016

Establishes new physics B.S. program



## Florida A&M University 2017

- 
- 
- Establishes CREST Center for Complex Materials Design for Multidimensional Additive Processing
- 
- 



## North Carolina A&T State University 2008

The 1997 CREST Center for Advanced Materials and Smart Structures receives an award and is recognized as the only HBCU-led Engineering Research Center.

## Virginia Union University 2017



Establishes new physics B.S. program

### Timeline Key

 HBCU-UP Investment

 CREST Investment



# Collaborations, Outreach, In-Reach

- Workshops to help potential applicants
- Numerous outreach site visits and webinars
- Annual PI meeting in February in Washington, DC
- Collaboration with White House Initiative on HBCUs, Department of Energy, Department of Education, as well as Environmental Protection Agency
- HBCU WG of NSF program officers from all directorates
- Webinars and townhalls for NSF POs
- Presentations at division meetings, retreats, and PI meetings of other NSF programs



# Challenges and Opportunities

- Systemic and historic underfunding of HBCUs is the source of many challenges.
- These institutions are the scientific, economic and cultural drivers in their communities.
- Faculty are poised to do research.
- Significant pockets of research exist at the 12 R2 institutions, as well as others.
- HBCUs know how to navigate challenging times.



# Some Lessons Learned from HBCU-UP

- Moderate funding has had enormous impact on small HBCUs.
- Research Initiation Awards foster the research capacity of individual faculty, and thus of the institution.
- Research in STEM education has brought new knowledge in learning and teaching.
- HBCU students are the ultimate beneficiaries.
- HBCUs need the support of NSF to make additional strides in STEM education and research.



# Additional Information on Appended Slides

Data in this presentation is from the following sources:

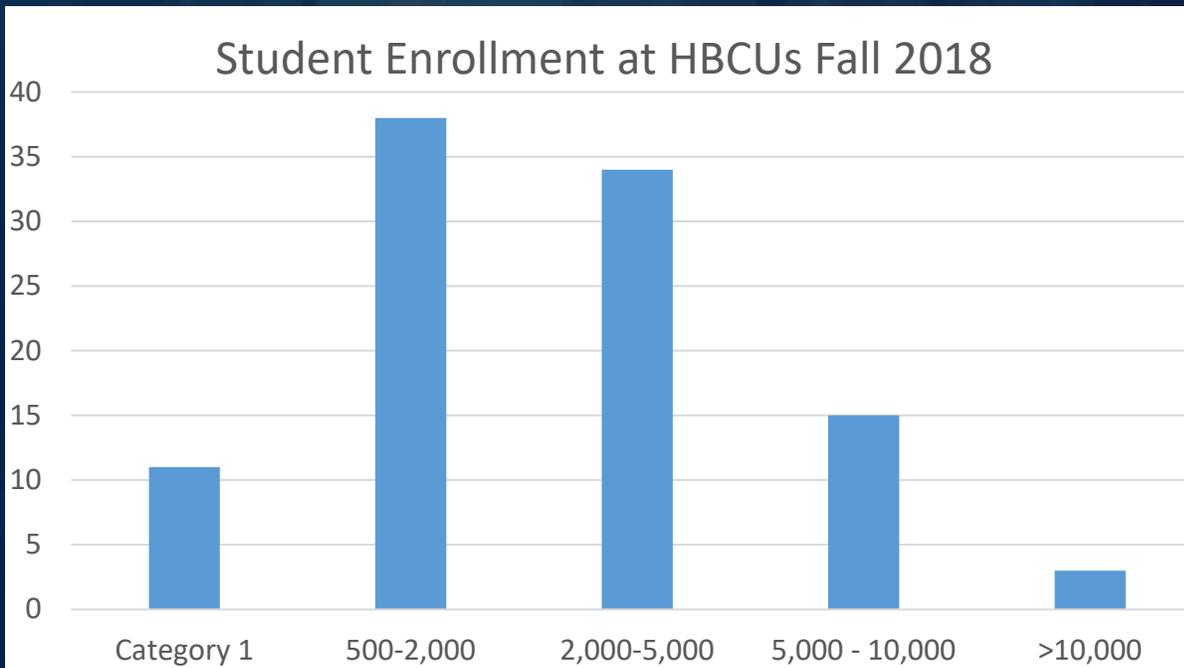
- The US Department of Education at <https://www2.ed.gov/rschstat/catalog/index.html>
- The National Science Foundation at <https://www2.ed.gov/rschstat/catalog/index.html> and <https://www.nsf.gov/awardsearch/>
- The internal NSF Enterprise Information System. However, only information that is publicly available was used.





**Thank you!**

# HBCU Size and List of R2 Institutions



## HBCUs classified as R2 Institutions

Clark Atlanta University  
Delaware State University  
Florida A&M University  
Hampton University  
Howard University  
Jackson State University  
Morgan State University  
North Carolina A&T State University  
Tennessee State University  
Texas Southern University  
University of Maryland Eastern Shore



# Additional Information about HBCUs

Top 20 baccalaureate institutions of black or African American S&E doctorate recipients, by science and engineering: 2013–17

|  |     |
|--|-----|
| Howard U. *                                    | 111 |
| Spelman C. *                                   | 95  |
| Florida A&M U. *                               | 68  |
| U. Maryland, Baltimore County                  | 58  |
| Hampton U. *                                   | 52  |
| Jackson State U. *                             | 46  |
| Morehouse C. *                                 | 46  |
| North Carolina Agricultural and Technical SU * | 44  |
| U. Maryland, College Park                      | 43  |
| U. Florida                                     | 41  |
| U. North Carolina, Chapel Hill                 | 41  |
| Xavier U. Louisiana *                          | 39  |
| Florida State U.                               | 35  |
| Yale U.  | 35  |
| Morgan State U. *                              | 34  |
| Southern U. and A&M C., Baton Rouge *          | 33  |
| Stanford U.                                    | 32  |
| Tuskegee U. *                                  | 31  |
| Harvard U.                                     | 30  |
| U. Michigan, Ann Arbor                         | 30  |

## The 15 HBCUs with ABET Accredited Engineering Schools

Alabama A&M University

Florida A&M University (jointly with Florida State University)

Hampton University

Howard University

Jackson State University

Morgan State University

Norfolk State University

North Carolina A&T State University

Prairie View A&M University

Southern University and A&M College

Tennessee State University

Tuskegee University

University of the District of Columbia

University of Maryland Eastern Shore



# Number of Proposals funded to HBCUs by NSF Division

| DIR  | DIV  | 2015 | 2016 | 2017 | 2018 | 2019 |
|------|------|------|------|------|------|------|
| BIO  | DBI  | 1    | 5    | 2    | 5    | 4    |
| BIO  | DEB  |      |      | 2    | 3    | 1    |
| BIO  | IOS  |      | 2    | 1    | 3    | 8    |
| BIO  | MCB  | 1    | 1    |      | 4    | 2    |
| CISE | ACI  | 2    | 3    |      |      |      |
| CISE | CCF  |      |      |      |      | 2    |
| CISE | CNS  | 1    | 8    | 2    | 10   | 7    |
| CISE | IIS  | 2    |      | 2    | 3    | 5    |
| CISE | OAC* |      |      |      | 7    | 1    |
| EHR  | DGE  |      | 3    | 7    | 2    | 3    |
| EHR  | DRL  | 1    | 1    | 5    | 1    |      |
| EHR  | DUE  | 13   | 7    | 8    | 8    | 9    |
| EHR  | HRD  | 68   | 85   | 64   | 76   | 82   |
| ENG  | CBET | 2    | 3    | 6    | 6    | 8    |
| ENG  | CMMI | 3    | 1    | 1    | 1    | 4    |
| ENG  | ECCS | 2    | 1    | 1    | 4    | 2    |
| ENG  | EEC  | 3    | 3    | 7    | 5    | 2    |
| ENG  | IIP  | 5    | 2    | 1    |      | 4    |

| DIR          | DIV  | 2015       | 2016       | 2017       | 2018       | 2019       |
|--------------|------|------------|------------|------------|------------|------------|
| GEO          | AGE  | 1          | 1          | 1          | 6          | 3          |
| GEO          | EAR  |            | 1          |            | 1          |            |
| GEO          | ICER | 1          | 2          | 1          | 3          | 4          |
| GEO          | OCE  | 2          |            | 1          | 2          | 2          |
| GEO          | PLR  |            | 1          |            |            |            |
| MPS          | AST  |            |            | 1          | 1          | 2          |
| MPS          | CHE  | 3          | 3          | 3          | 4          | 1          |
| MPS          | DMR  | 5          | 5          | 6          | 10         | 7          |
| MPS          | DMS  | 2          | 1          |            | 7          | 2          |
| MPS          | PHY  | 6          | 2          | 2          | 5          | 4          |
| O/D          | OIA  |            | 4          | 1          | 2          |            |
| O/D          | OISE |            | 1          |            |            |            |
| SBE          | BCS  | 1          | 3          | 1          | 5          | 2          |
| SBE          | SES  | 3          | 1          | 2          | 4          | 1          |
| SBE          | SMA  | 1          |            | 1          | 1          | 1          |
| <b>Total</b> |      | <b>129</b> | <b>150</b> | <b>129</b> | <b>189</b> | <b>173</b> |



# Number of HBCUs Receiving NSF Funding

Table - Number of HBCUs receiving NSF funding for science and engineering activities.

| Number of HBCUs that...    | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 |
|----------------------------|------|------|------|------|------|------|------|------|------|------|
| received any SE funding    | 48   | 50   | 54   | 56   | 55   | 46   | 53   | 53   | 47   | 53   |
| received any R&D funding   | 42   | 36   | 45   | 43   | 45   | 31   | 39   | 34   | 30   | 36   |
| Received >\$1m R&D funding | 17   | 11   | 13   | 10   | 10   | 11   | 9    | 12   | 6    | 13   |
| Received >\$2m R&D funding | 8    | 3    | 7    | 2    | 3    | 4    | 3    | 3    | 4    | 6    |

