Building America’s Future Homeland Security Science and Engineering Workforce
Science and Engineering Workforce Development

MISSION

- Build a stable community of homeland security researchers and educators at U.S. colleges and universities
- Foster a homeland security culture within the academic community through research and educational programs
- Strengthen U.S. scientific leadership in homeland security research and education
- Generate and disseminate knowledge and technical advances to advance the homeland security mission
- Integrate homeland security activities across agencies engaged in relevant academic research
- Develop a permanent homeland security science and engineering workforce

FOR A COMPLETE LIST OF COES, AND TO LEARN MORE ABOUT THE DEPARTMENT OF HOMELAND SECURITY SCIENCE AND TECHNOLOGY DIRECTORATE OFFICE OF UNIVERSITY PROGRAMS, PLEASE VISIT

www.dhs.gov/science-and-technology/office-university-programs

www.hsuniversityprograms.org/centers/
Meet Our Students

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP) offers a unique set of experiences for science and engineering students through homeland security internships, Minority Serving Institutions (MSI) grant programs and DHS Centers of Excellence (COEs).

The COEs are a network of university-led centers comprised of 200 universities and partners in nearly 40 states and territories. Partners include academia, industry, DHS components, national laboratories, other federal agencies, state and local homeland security agencies, and first responders. Working as a consortia, they develop customer-driven, innovative tools and technologies to solve real-world challenges and build the homeland security science and engineering workforce.

Since 2005, our programs have funded 430 interns, 5,074 graduate and undergraduate students, and 327 faculty from academic programs across the United States, including 45 minority serving institutions.

Kimberly Aguilera participated in the 2017 DHS Summer Internship Program at the U.S. Customs and Border Protection (CBP) laboratories analyzing diamonds’ geographic origin to help prevent illegal trading activities.

Dr. Jennifer Kovacs and Shelby Wilkes from Spelman College participated in a 2014 Summer Research Team at the National Center for Border Security and Immigration helping CBP enforce trade compliance and tariff collections by creating a searchable pollen grain database.
Since 2008, more than 400 university students participated in summer research experiences at federal research facilities across the country as part of the DHS Homeland Security – Science, Technology, Engineering, and Mathematics (HS-STEM) Summer Internship Program. The DHS Summer Internship Program provides students the opportunity to engage with a diverse, educated, and skilled pool of scientists and engineers. They also develop long-term relationships with other students, researchers, and homeland security professionals, which helps to enhance the HS-STEM workforce.

Sarah Parker, a microbiology and cell science student, spent her summer as an intern in the 2017 DHS Summer Internship Program, investigating decontamination methods in animals for diseases and pathogens, such as Foot and Mouth Disease, that pose a threat to the meat and dairy industries.

While participating in the 2016 DHS Summer Internship Program, Julian Barnes, a computer science student, investigated how emergency responders could benefit from wearable stress management monitoring devices while participating in the 2016 DHS Summer Internship Program.
Cristina E. Muñoz, a DHS Summer Internship Program participant, spent her summer at the Federal Emergency Management Agency in Washington, D.C., developing a conceptual framework on community resilience.

In September 2016, a few weeks after Cristina E. Muñoz completed her summer internship in the DHS Summer Internship Program, the state of Iowa—and several other parts of the country—experienced devastating floods. As floodwaters began to threaten the homes, livelihoods and the safety of thousands of individuals, the importance of Muñoz’s summer research at the Federal Emergency Management Agency (FEMA) in Washington, D.C. emerged.

Muñoz spent her summer developing a framework that describes and measures community resilience (the ability to prepare, respond, adapt, recover, and learn from disasters) specifically to floods. She presented her framework both within FEMA and externally at the annual Natural Hazards Workshop in Colorado.

Affected by the floods in the summer of 2016, the State of Iowa will implement Muñoz’s community resilience framework as part of the Iowa Watershed Approach (IWA) project. The U.S. Department of Housing and Urban Development funds IWA through the National Disaster Resilience Competition to improve Iowa’s water quality and resilience to flooding. As part of the IWA Resilience Team, Muñoz will help write a resilience action plan for eight Iowa watersheds through community engagement and consultation.
Since 2005, more than 200 students and faculty from Minority Serving Institutions (MSIs) each spent 10 consecutive weeks during the summer working hand-in-hand with top scientists at university-led DHS COEs. These faculty and student teams participated in the DHS Summer Research Team (SRT) Program, which increases and enhances the scientific leadership at MSIs in research areas that support DHS’s mission and goals. Most accredited U.S. postsecondary institutions that meet the statutory criteria for identification as MSIs are listed on the U.S. Department of Education website.

Charkyria Evans and Dr. Marilyn Tourne from Tuskegee University, at the Center of Excellence for Awareness & Localization of Explosives-Related Threats (ALERT), University of Rhode Island (2014). Charkyria and Dr. Tourne worked on understanding the performance of perchlorate explosives in commercial explosive instruments.

Dr. Mohammad Hossain, Felicia Horne, and David Yarbrough from Tuskegee University, at the Coastal Resiliency Center of Excellence (CRC), North Carolina State University (2014). The team worked on developing next generation self-healing technology for rapid repair and strengthening of critical civil infrastructures.
Spotlight: Minority Serving Institutions Team Contributes to Zoonotic Animal Disease Research

**Dr. Matthewos Eshete and Kayla Bailey** from Mississippi Valley State University collaborated at the Zoonotic and Animal Disease Defense Center co-lead, Kansas State University, to examine nanoparticle interactions—a key aspect in developing better disease diagnostics for highly contagious pathogens.

Dr. Matthewos Eshete, an associate professor of chemistry at Mississippi Valley State University (MVSU), and Kayla Bailey, a junior in chemistry at MVSU, participated in the program during the summer of 2016.

At Kansas State University, the co-lead for the Zoonotic and Animal Disease Defense (ZADD) COE, Bailey and Eshete researched biodegradable nanoparticles to better understand their binding interactions with proteins in the body. One of the many aspects of homeland security is protecting the nation’s agriculture and public health against transboundary disease threats; Bailey and Eshete’s research is part of ongoing efforts to identify these threats. Bailey learned a wealth of new information on nanoparticles, proteins, and scientific procedures. “This was my first research experience and it was a total learning experience—a positive one...before this research experience, I was uncertain about my future career plans.”

“The experience strengthened my desire to motivate students, especially underrepresented minority students, to become key participants in science and technology for homeland security,” said Eshete, who is continuing research on the project at MVSU through a collaborative partnership he formed with Kansas State. **Eshete’s research will have an impact on advancing knowledge and diagnostics of various diseases that will benefit agencies such as the Transportation Security Administration, Office of Health Affairs, and Customs and Border Protection, among others.**
Since its inception in 2007, more than 1,000 undergraduate students, graduate students, and faculty have joined the DHS Scientific Leadership Awards (SLA) program, which develops homeland security science and engineering teaching initiatives and curricula at MSIs across the nation. Sixty-five MSIs received more than $34 million in SLA awards since 2007. SLA students receive partial or full scholarships for education in science, engineering, and mathematics. This program has generated over 400 publications and curricula on homeland security topics such as emergency management, maritime security, biological threats, and cybersecurity.

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**Scientific Leadership Awards for Minority Serving Institutions**

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SLA student and faculty recipients from Jackson State University attended the Annual Emergency Management Higher Education Symposium in 2016.

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Visual Analytics for Command, Control and Interoperability Environments (CVADA, Purdue) Center held the 2016 Visual Analytics MSI Faculty Training Workshop for SLA recipients.
Texas Southern University students participated during the 2016 Summer Maritime Academy, a five-day, non-residential program designed to introduce students to the maritime industry.

Texas Southern University (TSU) received a DHS SLA for MSIs in September 2014. Through this five-year award, TSU aims to increase the pipeline of STEM majors for maritime transportation security through interdisciplinary undergraduate research and education. To achieve this goal, the program identified three specific objectives:

1. Develop an integrated research and education program to provide innovative technology solutions for the Homeland Security Enterprise (HSE), particularly for maritime transportation security;
2. Develop an interdisciplinary undergraduate curriculum to prepare a technically savvy workforce in Maritime Transportation Security; and
3. Increase the number and quality of students who graduate in a STEM discipline within MSIs.

The Department of Transportation Studies at TSU provides learning and networking opportunities to undergraduate students by hosting numerous events and encouraging students to participate during various maritime security-related conferences.

In order to create value to DHS, TSU continues collaborating with DHS COEs, CBP, and U.S. Coast Guard. Ultimately, the goal of the TSU program is to build strong risk assessment, management, and data analysis skills for maritime trade and port security. This will help provide DHS components a workforce equipped with specialized skills for addressing port resiliency planning and maritime emergency response efficiency.
The DHS Homeland Security – Science, Technology, Engineering, and Mathematics Summer Internship Program provides participants with quality research experiences at federal research facilities located across the country. The goal of the program is to engage a diverse, educated, and skilled pool of scientists and engineers in HS-STEM areas and to promote long-term relationships among students, researchers, DHS, and research facilities to enhance the HS-STEM workforce.

**BENEFITS**
The DHS HS-STEM Program, led and funded by DHS S&T, provides participants with weekly stipends over a 10-week internship period to cover their living expenses. Participants also receive limited reimbursement for round-trip transportation for travel to and from hosting sites.

**ELIGIBILITY**
To be eligible for participation, students must be U.S. citizens, have cumulative grade point averages (GPAs) of 3.30 or higher on a 4.00 scale, and major in an HS-STEM discipline. The program is open to sophomore, junior, or senior undergraduate students and graduate students at the time of application, who also plan to enroll in school after the summer internship ends.

**COMPLETION REQUIREMENTS**
Before the internship ends, participants must complete the following under their mentors’ supervision:

- Construct a poster or give an oral presentation to the scientific community at their hosting site.
- Complete a feedback survey about the program, the hosting site, and their mentor(s).
- Write a report summarizing the overall research experience, including a description of their internship project and their specific role, their achievements during the internship, new skills and knowledge gained, enrichment activities sponsored by the hosting site, and how the internship benefited their personal and professional development.

Additionally, mentors are expected to help participants meet the program requirements and are also encouraged to complete a feedback survey about the participants and the program.

**APPLICATION**
Apply for the DHS HS-STEM Summer Internship program at http://www.orau.gov/dhseducation/internships.

*Bryan Clayborne participated in the 2017 DHS Summer Internship Program, developing a sociological framework for understanding Coastal Flooding in the African American community.*
Since its inception in 2005, the DHS S&T Directorate has led and funded the DHS Summer Research Team Program. The purpose of the DHS Summer Research Team Program is to increase and enhance the scientific leadership at Minority Serving Institutions in research areas that support DHS’s mission and goals. Through the SRT program, faculty and student research teams conduct research at university-based DHS COEs for 10-consecutive weeks during the summer. The DHS COE network is an extended consortium of hundreds of universities generating ground-breaking ideas for new technologies and critical knowledge, while also relying on each other’s capabilities to serve the Department’s many mission needs. The DHS COEs organize leading experts and researchers to conduct multidisciplinary homeland security research and education.

**BENEFITS**

The DHS SRT Program provides participants with a weekly stipend during the 10-week internship period, as follows:

<table>
<thead>
<tr>
<th>Weekly Stipend:</th>
<th>Housing Allowances:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty - $1,200</td>
<td>Faculty - $1,500</td>
</tr>
<tr>
<td>Graduate students - $700</td>
<td>Students - $1,000</td>
</tr>
<tr>
<td>Undergraduate students - $600</td>
<td></td>
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</tbody>
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**ELIGIBILITY**

Active MSI faculty members and students enrolled in a discipline, major or concentration directly related to an HS-STEM research area are encouraged to apply. Teams must consist of one faculty member and up to two students (undergraduate and/or graduate level). Awards will not be granted to teams without a student or faculty member. All team members must be U.S. citizens by the application deadline.

**COMPLETION REQUIREMENTS**

**All Team Members**
- Conduct a team research briefing at the DHS Center near the end of the summer research experience.
- Complete a program feedback form by the last day of the research appointment.
- Submit an eight- to ten-page summary report on his or her research experience by the last day of the research appointment.

**Faculty Team Members Only**
Submit a one-to two-page plan addressing how he or she will integrate the DHS summer research experience into the classroom.

**APPLICATION**
To apply for the SRT program, visit [http://www.orau.gov/dhseducation/faculty/index.html](http://www.orau.gov/dhseducation/faculty/index.html).
The DHS Scientific Leadership Awards program focuses on integrating MSIs into homeland security academic programs with the goal of building capabilities for homeland security research and engineering workforce development at MSIs across the Nation. The SLA program provides institutional awards to support the development of homeland security science and engineering teaching initiatives, curriculum development, and student scholarships in science, engineering and mathematics fields and requires research collaboration with DHS COEs.

Successful applicants come from Historically Black College and University (HBCU), Hispanic Serving Institution (HSI), or Tribal College and University (TCU) that 1.) possess the capabilities to develop an enduring program of undergraduate education and relevant HS-STEM research and development, and 2.) collaborate with our existing research COEs, who are currently performing work related in areas critical to homeland security.

**BENEFITS**

Subject to the availability of funds, DHS provides funding for up to five years to any eligible MSI with an HS-STEM program of study. DHS awards funds in two phases, averaging $500,000 (with a maximum of $750,000) for each phase.

**ELIGIBILITY**

Proposals may be submitted only by accredited HBCU, HSI, or TCU academic institutions in the U.S., its territories or possessions, and the Commonwealth of Puerto Rico, that award bachelor degrees in science (including social science), technology, engineering and/or mathematics fields. DHS only accepts one application per eligible institution.

**APPLICATION**

The SLA program solicits applications through a biennial competition. Application forms and instructions are available at Grants.gov. To access these materials, go to [http://www.grants.gov](http://www.grants.gov), select “Applicants” then “Apply for Grants”. Before applying for a DHS grant, the candidate must have a DUNS number, be registered in the System for Award Management, and be approved as an Authorized Organizational Representative. For instructions on obtaining a DUNS number, visit the following website: [https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html](https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html).
DHS COEs develop multidisciplinary, customer-driven, homeland security science and technology solutions and train the next generation of homeland security experts. The following COEs and Emeritus COEs are referenced in this booklet:

**Center of Excellence for Awareness & Localization of Explosives-Related Threats (ALERT):** Led by Northeastern University, develops new means and methods to protect the nation from explosives-related threats. Page 5

**Coastal Resilience Center of Excellence (CRC):** Led by the University of North Carolina at Chapel Hill, conducts research and education to enhance the Nation’s ability to safeguard people, infrastructure, and economies from catastrophic coastal natural disasters, such as floods and hurricanes. Page 5

**Center of Excellence for Zoonotic and Animal Disease Defense (ZADD)*:** Co-led by Texas A&M University and Kansas State University, protects the Nation’s agriculture and public health sectors against high-consequence foreign animal, emerging, and zoonotic disease threats. Page 6

**Center for Visualization and Data Analytics (CVADA)*:** Co-led by Purdue University (visualization sciences-VACCINE) and Rutgers University (data sciences-CCICADA), creates the scientific basis and enduring technologies needed to analyze large quantities of information to detect security threats to the Nation. Page 7

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* Emeritus DHS S&T Centers of Excellence no longer receive base grant funding. DHS offices and operational components can access Emeritus centers through DHS Basic Ordering Agreements (BOAs).

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