

**Project Abstracts for  
Fiscal Year 2019  
Minority Science and Engineering  
Improvement Program**

**New Awards**

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## CA - California State University - San Marcos Corporation

San Marcos, CA  
Institutional Grant  
P120A190093

### Abstract

The proposed FIRST2STEM program at California State University San Marcos (CSUSM) will serve undergraduate STEM majors who require enrollment in a developmental math pathway before calculus—the gateway mathematics course for their majors. These students require two additional courses, which sets their academic timeline behind their peers at a critical period in which they can lose motivation to pursue their majors. At CSUSM, **36.9 percent of URM STEM majors require the developmental math pathway compared to 13.08 percent of non-URM STEM majors**. Moreover, there is a substantial gap in passing rates between URM students (59.8 percent) and their non-URM peers (73.4 percent). This **three-year project** totaling \$748,966 in requested funding will enable CSUSM to affect **long-range improvement** of graduation rates for URMs and women in STEM disciplines.

The FIRST2 STEM Project will meet the following four **objectives**:  
increase their enrollment and pass rates in calculus;

- 1) increase their academic and social integration;
- 2) increase their retention and graduation rates overall; and
- 3) increase their retention and graduation within STEM without a change in major to outside of the College of Science and Mathematics (CSM).

FIRST2STEM is a **comprehensive program** focused on the **first two years** of the undergraduate experience as participants progress through the developmental math pathway. Based on ongoing work through the Office of Undergraduate Studies (OUGS) to support the success of students in the College of Science and Mathematics (CSM), this program will complement CSM's classroom initiatives by supporting URM students outside of the classroom through **co-curricular support**, including **peer tutoring, peer mentorship, additional advising, community building, and introduction to undergraduate research experience**. These activities are geared toward promoting **academic success** and **identity** among participants, which is a strong predictor of **persistence** in STEM.

Culturally competent project personnel will implement the program. Starting the summer before their freshman term, participants will be enrolled in summer bridge programming that includes **Early Start mathematics preparation, mathematics workshops, and STEM programming**, which includes meeting **CSM faculty** and visiting **industry sites**. FIRST2STEM participants will then be enrolled in cohorts within the University's Lifelong Learning course where the Project Director will introduce them to campus resources, to CSM faculty, and to projects that will allow them to explore **scientific problem-solving, entrepreneurship, research literacy, and financial literacy**. The cohort will progress through their first two years with regular mathematics tutoring, professional development programming, intrusive advising, and opportunities to shadow upper division research students in faculty laboratories.

The proposed intervention meets the first Competitive Preference Priority (**CPP One**) of promoting innovation and efficiency in the educational process because supporting participants to succeed the first time in courses means they are more likely to progress in a timely manner to degree completion, a cost-saving measure for students and taxpayers alike. The second Competitive Preference Priority (**CPP Two**) of promoting skills to prepare participants to be thoughtful and productive citizens is met by the programming that includes the Lifelong Learning course, where students will practice critical thinking skills, learn about how to conduct research, and be taught financial literacy to help them plan for their lives.

**DC - Howard University**

Washington, DC  
Institutional Grant  
P120A190018

Abstract

This Institutional Project grant proposal aims to develop an undergraduate research platform in which students from underrepresented populations in Science and Engineering disciplines at Howard University (HU) will participate in industry-identified research themes and projects under the mentorship of the faculty. The focus will be on STEM students with GPAs of 2.00-3.00 or non-scholarship students at the freshman and sophomore levels where the stimulation of scientific interest through participation in real-world, hands-on research projects at the early years of STEM education are proven to boost both retention and graduation rates. The identification of industry-defined research themes and projects will be done through industry involvement. This project addresses both competitive priorities of promoting innovation, improving educational outcomes for student and educator, supporting research, and discussing financial literacy that result in the engagement of students in devising innovative solutions to real-world problems.

Fifty students per year will be targeted and the measurable objectives are:

- Providing undergraduate students in STEM, especially those with a GPA range of 2.00-3.00 at the freshman and sophomore levels, an undergraduate research experience on industry-defined themes and projects under the mentorship of HU faculty;
- Preparing students for internship and career opportunities in industry by equipping them with the necessary research skill set which is aligned with the needs of the industry;
- Providing HU STEM faculty the opportunity to become familiar with industry needs through the planned Bi-annual Workshops involving industry recruiters and leaders; and
- Encouraging faculty to engage in collaborative research and proposal preparation in addressing the emerging needs of industry collaborators and recruiters.

## DC - Howard University

Washington, DC  
Special Projects Grant  
P120A190033

### Abstract

“Precollege Program and Access to Careers in Engineering” (PPACE) under **Special Projects** directly addresses **Competitive Preference Priorities 1 and 2**.

In an effort to improve minority ninth grade students’ attitudes toward STEM fields especially in the field of engineering Howard University School of Education (Curriculum and Instruction Department and Human Development and Psychoeducational Studies Department), College of Arts and Sciences (Department of Mathematics); College of Engineering, Architecture and Computer Sciences; Center for Excellence, Teaching, Learning and Assessment (CETLA); and Office of Undergraduate Studies in collaboration with Texas Southern University School of Education (Curriculum and Instruction) and Liberal Arts (Department of Mathematics) will design a program for precollege and undergraduate students to improve attitudes toward STEM fields especially engineering among precollege students.

The overall goal of this project is to improve attitudes toward STEM fields, especially engineering, among precollege student and increase academic performance of HU and TSU students.

The objectives are to:

1. Increase ninth graders’ content knowledge and skills in Algebra I.
2. Use the Engineering Design Process (EDP) to foster interest in STEM careers
3. Expose students to readiness strategies to maximize their success in college to undertake (STEM) courses of study
4. Provide opportunities for teachers of algebra to use the Next Generation of Science Standards (NGSS), and National Council of Teachers of Mathematics (NCTM) standards to incorporate algebra topics used during the EDP precollege program in their existing lessons
5. Deliver tutoring services for undergraduates taking college algebra to help increase their academic performance (Competitive Preference 1) during the fall semester.
6. Offer rising undergraduate student who are seniors majoring in a STEM area with knowledge and skills aimed at personal financial understanding and responsibility (Competitive Preference Priority 2) - five sessions during the fall and five sessions during the spring semester.

Howard University and Texas Southern University will develop a three-week precollege program to address and improve attitudes toward STEM fields especially engineering among precollege student. This program addresses Competitive Preference Priorities 1: Supporting instruction in personal financial literacy for rising senior undergraduate students who majoring in a STEM area; and 2: Deliver tutoring services for undergraduate students taking algebra who are concern about being successful in the course. PPACE is a five-tier program designed to increase the number high school and undergraduate students’ interest and success in STEM subjects and careers.

The program includes 1) a three week Summer Program incorporating the EDP for rising ninth grade students and teachers in algebra; 2) an online college readiness advising component for students and parents; 3) opportunities for teachers of algebra to use EDP using science and mathematics standards in their existing lessons; 4) tutoring services for undergraduate students who are having difficulty in their algebra class; and 5) financial literacy seminars that will be offered for rising senior STEM majors.

Expected Outcomes are: 1) additional 300 high school students will be interested in pursuing a career in a STEM area and prepare to attend college; 2) an additional 24 teachers using EDP with their students; 3) an additional 40 undergraduate students will successfully pass algebra; and 3) increase 100 students’ knowledge on financial literacy.

## **FL - Florida Agricultural and Mechanical University**

Tallahassee, FL  
Special Projects Grant  
P120A190042

### Abstract

Research has well established that the U.S. needs to grow its Science, Technology, Engineering and Mathematics (STEM) workforce to remain competitive on the global stage. One of the major ways to meet this national need is to more greatly engage traditionally underrepresented in these fields. Research has hypothesized that diverse STEM-based disciplines related to environmental applications may draw these students due to the potential societal long-term impacts associated with these careers. The goal of the Program of Excellence in STEM Environmental Education at Florida A&M University is to increase the number of underrepresented STEM students who enroll in and graduate with research experience in environmentally related STEM disciplines. Focusing on *recruitment, retention, and graduation*, this project will strengthen existing STEM programs by recruiting students who have been exposed to environmental research methods and skills through program activities. This exposure will be based on participation in active learning, stimulating environmentally relevant activities to inspire them to seek participation in those fields in their future education and career goals, while additionally motivating them to succeed in STEM courses in their present studies. This project has the potential to effect long-term improvement in STEM departments at Florida A&M University through increased enrollment of underrepresented students, particularly women. Impacting 40 students a year, the goals of the project mirror the expected outcomes over the three-year project which include the following: (1) increase the number of underrepresented K-12 students, especially women, that enroll in environmentally-related STEM-based disciplines in college, especially at FAMU; (2) increase the GPAs of these entering STEM students in foundational courses (Calculus, Chemistry, Biology, Intro to Engineering, Physics, and Intro to Programming) and those specifically environmental related courses (Intro to Environmental Engineering, Intro to Environmental Sciences, Sustainability, and Environmental Chemistry) prior to their enrollment, through summer preparatory courses, program workshops, and academic research opportunities; (3) increase retention of those students within STEM disciplines through advisement, mentoring and research opportunities; (4) increase number of those undergraduates conducting, reporting and presenting on environmental research within STEM disciplines; (5) increase number of STEM faculty involved in mentoring students involved in undergraduate environmental research; and (6) increase the number of high school STEM instructors who have been trained and can effectively teach STEM-related courses to potential STEM students.

Project activities include:

(1) exposure of underrepresented students to careers in environmental STEM disciplines; (2) introduce these students to STEM-related research methods in workshops; (3) implementation a comprehensive summer camp with a focus on environmental research collaborations with university STEM faculty and implementation of STEM preparatory courses; (4) enhancement and development of instructional curriculum that models current foundational courses for STEM majors; (5) training high school faculty in use of research methods in instruction; and (6) exploration of opportunities for cross-disciplinary research collaboration in environmentally- related STEM disciplines. These activities will help the PE-STEM Environmental Education Program to address both the *Competitive Preference Priority 1* and *Competitive Priority 2* of the 2019 MSEIP announcement, as well as the *Invitational Priority*.

**FL - Florida Agricultural and Mechanical University**

Tallahassee, FL  
Institutional Grant  
P120A190064

Abstract

The U.S. needs to grow its Science, Technology, Engineering and Mathematics (STEM) workforce to remain competitive on the global stage. As science and engineering capabilities of the U.S. must increase, many view groups with lower rates of participation in these disciplines as an underutilized source of human capital, and that participation of traditionally underrepresented groups in STEM fields must increase. Fields and disciplines with environmental applications have been shown to draw these students due to the potential societal long-term impacts associated with these careers. The goal of the Program of Excellence in STEM Environmental Research at Florida A&M University is to increase the number of underrepresented STEM students who enroll in and graduate with research experience from environmentally-related STEM disciplines. This goal will be accomplished by following a three-tiered approach highlighting *reinforcement*, *retention*, and *graduation*. These supports will strengthen students in STEM disciplines by incorporating program-supported including: 1) tutorial courses based on foundational STEM-courses during the academic year; 2) supplementary summer STEM foundational courses; 3) environmentally-relevant research in faculty-mentored projects and/or environmental industry-based internships; and 4) mentorship with faculty dedicated to improve the students' overall academic and professional potential in their environmental STEM discipline.

These activities will support and incentivize student success which will inspire them to seek participation in those fields in their future education and career goals, while additionally motivating them to succeed in STEM courses in their present studies. This project has the potential to effect long-term improvement in STEM departments at Florida A&M University through increased academic success and graduation of underrepresented students, particularly women, in STEM fields with environmental relevance. Impacting 30 students a year including sophomores, juniors, and seniors, the goals of the project mirror the expected outcomes over the three-year project which include the following: (1) increase the GPAs of students within environmentally-related STEM disciplines, especially in foundational courses (Calculus, Chemistry, Biology, Intro to Engineering, Physics, and Intro to Programming), prior to reaching upper division (junior) status, through summer supplementary courses, tutoring during academic year, program workshops, and academic research opportunities; (2) increase the retention of these students within environmentally-related STEM disciplines through advisement, mentoring, and research & internship opportunities; (3) increase the number of students completing their degrees in environmentally-related STEM disciplines; (4) increase the number of these undergraduates participating in conducting, reporting, and presenting on research within STEM disciplines; and (5) increase the number of STEM faculty involved in mentoring students involved in undergraduate research, especially focused on significant environmental issues. These activities will help the PE-STEM Environmental Education Program to address both the *Competitive Preference Priority 1* and *Competitive Priority 2* of the 2019 MSEIP announcement, as well as the *Invitational Priority*.

## **FL - Florida Agricultural and Mechanical University**

Tallahassee, FL  
Special Projects Grant  
P120A190038

### Abstract

Conservative estimates indicate that the U.S. needs to grow its Science, Technology, Engineering and Mathematics (STEM) workforce to remain competitive on the global stage. The country can help alleviate this problem by tapping into the vast underutilized minority population that are traditionally underrepresented in these fields. Presently, these students are pursuing degrees in these disciplines at the rate needed for the U.S. to maintain, much less progress, in the growing science and technology-driven global community. The goal of the Program of Excellence in STEM Enrichment at Florida A&M University is to increase the number of underrepresented STEM students who enroll in and graduate with research experience in STEM disciplines. Using a three-tiered approach focusing on *recruitment*, *retention*, and *graduation*, this project will strengthen existing STEM programs by recruiting students who have been exposed to research methods and skills through program activities, and have been introduced to more rigorous scientific methods in their K-12 science, technology, engineering, and math courses through high school course enhancement and K-12 faculty development.

This project has the potential to effect long-term improvement in STEM departments at Florida A&M University through increased enrollment of underrepresented students, particularly women. Impacting 60 students a year, the goals of the project mirror the expected outcomes over the three-year project which include the following: (1) increased number of underrepresented students, especially women, that enroll in STEM disciplines in college, especially at FAMU; (2) increased GPAs of those entering students in STEM foundational courses (Calculus, Chemistry, Biology, Intro to Engineering, Physics, and Intro to Programming) prior to their enrollment, through summer preparatory courses, program workshops, and academic research opportunities; (3) increased retention of those students within STEM disciplines through advisement, mentoring and research opportunities; (4) increased number of those undergraduates conducting, reporting and presenting on research within STEM disciplines; (5) increased number of STEM faculty involved in mentoring students involved in undergraduate research; and (6) increased number of high school STEM instructors who have been trained and can effectively teach STEM-related courses to potential STEM students.

Project activities that will lead to these outcomes include: (1) identification and encouragement of underrepresented students who appear to possess an interest or ability for careers in STEM disciplines; (2) development and implementation a comprehensive academic year intervention to introduce these students to scientific and research methods and STEM-related workshops; (3) development and implementation a comprehensive summer camp with a focus on research collaborations with university STEM faculty and students and STEM preparatory course involvement; (4) enhancement and development of instructional curriculum that models current foundational courses for STEM majors; (5) training high school faculty in use of research methods in instruction; and (6) exploration of opportunities for cross- disciplinary research collaboration in STEM disciplines. These activities will help the PE-STEM Enrichment Program to address both the *Competitive Preference Priority 1* and *Competitive Preference 2* of the 2019 MSEIP announcement, as well as the *Invitational Priority*.

## **GA - Albany State University**

Albany, GA  
Special Projects Grant  
P120A190090

### Abstract

As an HBCU, Albany State University (ASU) serves an economically and educationally disadvantaged population that has been historically underrepresented in STEM Fields. As a primarily teaching university, ASU seeks to expand its research capabilities in the toxicology of endocrine disruptors. Endocrine disruptors (EDs) refer to chemicals that alter endocrine functions as well as adverse reproductive and developmental effects. Rural and lower income individuals who are disproportionately exposed to EDs have higher incidences of adverse health effects such as hypertension, cancer, asthma, diabetes, and heart disease.

Located in the heart of a poverty-stricken region where endocrine disruptors are routinely being used on agriculture, Albany State University is uniquely positioned to conduct studies on exposure routes of EDs to vulnerable populations. These studies would contribute to a growing body of literature on the link between endocrine-disrupting compounds and chronic illness.

Currently, ASU has the capacity to examine biomarkers of chemical exposure but lacks the capability to quantify the chemicals. Thus, the data may have implications for regulation of EDs, agricultural practices, health disparities research, and assessing health risks from exposure routes.

Our goals are to:

1. Enhance ASU's research capabilities by building the research environment to conduct toxicological research on EDs
2. Provide students with extensive research experience by integrating hands-on, research- oriented lectures into core a Freshman/Sophomore course Principles of Biology and into core a Junior/Senior course Environmental Biology.

The proposed program will provide an efficient, cost-effect system for toxicological research in ED exposure routes to vulnerable populations, a high-need research area. This, in turn, will provide students with extensive real-world research experience from planning to conducting experiments that impact them and their communities, and to provide them with guidance in analyzing, interpreting, and publishing the results.

## **GA - Clayton State University**

Morrow, GA  
Institutional Grant  
P120A190025

### Abstract

Clayton State University (CSU), part of the University System of Georgia, is a public university serving over 7000 students. Clayton State University is a predominately black/minority serving institution located in southeast metro Atlanta area. The goal of this project is to improve the retention and graduation rates of STEM majors from 15 percent to 30 percent or greater. To achieve this doubling of our current rate CSU is proposing the implementation of several synergistic projects focuses on year one and year two of students in a STEM major.

Project one is a one-week STEM Academic Boot Camp focused on mathematics, chemistry and physics problem solving. Included in these weeklong intense activities are study skills development, financial literacy that addresses Competitive Preference Priority 2 and development of learning communities within the STEM majors. Interlaced in this project is the development of Adaptive Learning Modules (ALMs) to improve student math skills and understanding of critical thinking that will be used in the STEM ABC and introductory math and chemistry courses.

Project two is the development of Course-embedded Undergraduate Research Experiences (CUREs) in the introductory Biology and Chemistry course. CUREs have been shown to increase student-learning outcomes and improve student understanding of scientific phenomena and retention.

Project three is the development of Faculty Learning Communities to share innovative ideas in the classroom that will improve student retention in STEM courses and ultimately graduation with a STEM degree.

The objective of these activities is to improve STEM student retention from in the early stage of matriculation from 40 percent to 60 percent at the end of year two for a freshman cohort, with an ultimate goal of increasing STEM graduation rates to greater than 30 percent.

## **GA - Paine College**

Augusta, GA

Institutional Grant

P120A190098

### Abstract

The overarching goals of this **Institutional** Project are to: Develop mathematical and analytical skills of Paine College students to improve their overall performance in STEM courses; Increase the pass rates of students in College Algebra, Chemistry, and other required mathematics courses for STEM majors; Facilitate the progression of STEM majors from the freshman to the sophomore level; Increase students' retention in the STEM majors at Paine College; and Develop students' quantitative and analytical skills so that they are better prepared for pursuing advanced degrees in science and engineering or careers in the STEM workforce. Proposed objectives and activities to achieve these goals are arranged in three (3) components: (1) Prematriculation Activities (Summer Enrichment Program); (2) Curriculum Revision; and (3) Student Retention and Development.

The overall objective of the summer enrichment program is to give the program participants (incoming Paine College freshmen) opportunities to develop mathematical skills with the goal of improving their preparedness for college algebra, other core mathematics courses and chemistry. The second component of this project involves the restructuring of STEM curriculum in order to enhance and update the content, activities, laboratory exercises and pedagogical methods, particularly in mathematics and chemistry courses, in order to create a learning environment that is stimulating, interactive, hands-on, as well as meaningful and useful for students at Paine. Retention activities (the third component) involve a mentoring program (Learning Communities) and opportunities to conduct summer and academic year laboratory research with STEM faculty, and present findings at scientific conferences. The intellectual merit of the proposed project is that it allows the various components described to be integrated into a comprehensive collaborative effort that improves and increases retention and graduation rates of underrepresented minorities in STEM disciplines.

The broader impact of the proposed project is at least three-fold: (1) data collected from project participants could be used by the institution and others to inform future STEM curriculum and infrastructure decisions; (2) strategies implemented in this project could be duplicated in other non-STEM-disciplines on campus; and (3) successes of this project can be disseminated to and used by other HBCUs and minority serving institutions to enhance their STEM programs and increase **STEM** graduation rates.

**GA - Savannah State University**  
Savannah, GA  
Institutional Grant  
P120A190051

### Abstract

Cybercrime has grown tremendously over the past several years as society's dependence on computers and the Internet technology increase continuously. Both common criminals and dangerous terrorists are getting more sophisticated in their hacking skills, with the continuously emerging army of exploits and malwares. The evolution of electronic communication technology has given cybercriminals various channels to compromise the cyberspace, ranging from social networks to mobile devices. Every effort to improve computer and operating system security has been challenged by bypassing authentication. Cybercriminals appear to be winning the battle as they continue to unlock the trick each time their spam and malwares are defeated. They collect information from the scanning process and exploit these vulnerabilities and victims to fully control the compromised systems. Therefore, there is an urgent demand for a continuous production of scientists with diverse expertise in protecting the confidentiality, integrity, and availability of the cyberspace to win this running battle against cyber attackers. Including underrepresented minorities and women in the pool of experts will greatly improve our chances of winning the battle. This application is to request funding for Savannah State University (SSU) to contribute in the effort by producing such vitally needed minority and women scientists. Project activities will expand access to cyber security/computer science education for minorities and women.

SSU offers an undergraduate degree in Computer Science Technology (CST). The CST curriculum is a hybrid of software and hardware courses and therefore a uniquely suited academic program to address the cyber security problem. SSU therefore seeks support for the infusion of cyber security relevant courses in its CST program. The proposed project would design and implement a cyber security degree track in its CST degree program for students who wish to concentrate and develop strong skills in cybercrime detection, disruption and defenses. The project will also provide cyber security courses for non-STEM majors who wish to protect themselves from cybercrimes. Minority and women students majoring in Homeland Security, Information Technology, as well as Forensic Science and other STEM students will have the opportunity to obtain a certificate, or minor in Cyber Security.

The intellectual merit of the proposed project lies in the academic courses that will be developed and delivered, and the variety and quality of knowledge and skills beneficiary students will gain. The degree program (Cyber Security track) will focus mostly on system assurance in terms of security but will include other courses that will give the student a balanced understanding of the topic. Students will learn about hacker behavior analysis, securing networks and supply chains, digital forensics and cryptography. They will acquire techniques for avoiding, finding, and fixing software vulnerabilities; and learn how to incorporate principles of usability into the design of secure systems, hardware design and security vulnerabilities. The project will produce a degree program qualified to seek NSA certification.

The broader impact of this project includes its ability to address the national security threats that have emerged from cyber terrorism by offering targeted courses for students in the Homeland Security degree program as well as for Criminal Justice, and Forensic Science Students. Graduates of these programs will learn the latest techniques in accumulating data and evidence for prosecuting cybercrimes. Furthermore, the escalating attacks on global information systems threaten national security, the world's economy, our daily lives, and individual privacy. There is therefore a need for cyber literacy among the citizenry, skills, and leadership knowledge to safeguard the cyberspace. Accordingly, other expected outcomes and broader impacts of the proposed project would be (a) an increase in the number of minorities and women experts who will maintain and protect resilient data systems as cyber security leaders in the fight against growing cybercrime in the country; (b) an increase in the number of minorities and women graduates in the United States that understand the wide range of vulnerabilities and threats that affect corporate and government computer networks and with ability to protect critical information in the cyberspace; (c) an increase in the number of minorities and women professionals in our country who can stop criminals from committing internet crimes; (d) an increase in the number of minorities and women forensic professionals who can track down and prosecute the elusive criminals perpetrating those crimes; and (e) increase in cyber literacy in the society at-large. Furthermore, since Savannah State University would be one of the few that offers a degree program in cyber security, this project will contribute immensely to the diversification of the nation's cyber security workforce.

**LA - Southern University at Shreveport**  
Shreveport, LA  
Institutional Grant  
P120A190058

#### Abstract

Southern University at Shreveport, SUSLA, a minority historically black college and university (HBCU) will initiate and implement a research intensive project in STEM examining the effects of an experimental freshman orientation (FROR) course and structured 1-credit Math lab on Developmental Mathematics (DM) students' ability to matriculate through to their first college Math course. This experimental research targets incoming freshmen and first year college students whose ACT scores and high school GPA did not meet the required achievement standard necessary to progress directly into college-level Algebra. The *Science, Technology, Engineering and Math- Minorities Against Barriers* project, (STEM-MAB), is a three-year institutional project and attempts to accomplish four specific goals: (1) increase university-wide enrollment, retention and matriculation in STEM majors, but more specifically, Math-related course offerings (2) provide faculty with the necessary tools for training and professional development to facilitate successful integration of the new course offerings (3) modernize current learning environment structures enabling support for differences in student learning (4) enable communities of learners between student cohorts matriculating from each of the newly developed curricula.

SUSLA offers associates degrees programs requiring College Algebra. The STEM-MAB project seeks to expand the STEM population through academic and experiential support in introductory and developmental Math courses, which can form the foundation of students' problem-solving abilities. The program's faculty involvement and experiential instructional strategies will contribute to facilitating a community of learners maximizing students' learning experience from the universities' perspective as well as that of their peers.

The STEM-MAB project will also examine students' self-efficacy throughout the cohort process detecting differences students' affective domains as they progress through the experimental courses. Data collected will be correlated with students' understanding of Mathematical concepts, environmental and demographic data as well as student achievement.

This project's objectives include: (1) increase student engagement, enrollment and retention in the university's STEM programs through student activities and participation aimed at (2) improve academic support by implementing an experimental freshman orientation course in addition to a structured 1-credit Math lab designed to "flip" classroom learning through experiential learning exercises and peer-assisted learning groups (3) increase student pass rates in developmental and gatekeeper Mathematics courses (MATH 095- Intermediate Algebra and MATH 133- College Algebra) to 75 percent by the third year of the project (4) infuse technology and establish an interdisciplinary STEM professional development workshop thread for STEM faculty focused on proven instructional strategies and educational pedagogies for problem-solving in the 21st century classroom.

Completing these objectives will be achieved through student outreach and engagement; student advisement, faculty development, faculty and peer mentoring; curriculum development and enhancement as well as facility and technology enhancements.

## MS - Jackson State University

Jackson, MS  
Institutional Grant  
P120A190049

### Abstract

Recruitment and retention efforts for underserved minority students often snag in the face of gatekeeper course imperatives to rapidly acquire content knowledge and skills for which our students have been vastly under-prepared, despite their aspirations. Lacking an effective framework of support in meeting these imperatives, students all too often leave their STEM majors – and even college altogether – when they encounter calculus, general and organic chemistry, and general physics. **TIGER-MS-STEM** responds to the commonly acknowledged need for an inclusive, high-quality, theoretically sound, and effective framework of support for such students. JSU draws 75 percent of its student body from failing, under-resourced K-12 pipeline schools in Mississippi counties, and often from neighborhoods with high poverty rates.

Underprepared at entry, the African American men and women STEM hopefuls from these schools are likely to face extremely daunting academic challenges, irrespective of talent, in their gatekeeper courses and laboratories. As many of these courses are offered by the Department of Chemistry, Physics, and Atmospheric Sciences (CPAS), it thus proposes the development and implementation of a unique, streamlined framework, **Taking the Initiative to Grow Enrollment and Retention (TIGER) of Minority Students (MS) in STEM (TIGER-MS-STEM)**, to efficiently support underprepared African American men and women students in improving STEM gatekeeper course outcomes and completing STEM majors. The program will advance: (1) STEM learning, sense of safety, and respect for diversity of underrepresented students, (2) a sense of belonging in STEM, (3) faculty-mentored, peer-supported, course-specific interventions to streamline and further underprepared student acquisition of fundamental skills and, through the program's broad implementation of faculty-student and peer-to-peer learning strategies, (4) improved student self-concept and self-efficacy.

**TIGER-MS-STEM** will add value to students' educational experience and taxpayer investments in the education of underrepresented minority students by countering both the discrepant K-12 preparation they have received and the long-espoused view that gatekeeper courses properly function to weed out under-prepared students, rather than support student understanding. To further innovation and improve efficiency in STEM education, **TIGER-MS-STEM** will: (1) implement targeted, ongoing professional development, and align faculty collaborations to better engage evidence- and inquiry-based pedagogies; (2) redesign all CPAS gatekeeper course curricula to fully implement evidence- and inquiry-based pedagogies, as well as redesign CPAS major seminars to explicitly develop critical thinking and presentation skills; (3) implement in all CPAS gatekeeper courses faculty-mentored, peer-supported drill-session activities to maximize course success, (4) improve faculty labs and collaborations with national research institutions to yield increases in internal and external student research opportunities, (5) improve collaborations with non-STEM JSU support centers, and (6) institute a comprehensive 'Research & Recruitment' program for rising high school seniors from JSU feeder schools.

The **TIGER-MS-STEM** framework has the potential to improve delivery of a high-quality, high-standard STEM education to underserved, underprepared minority men and women, effectively support JSU STEM students' recruitment, retention, graduation, and entry into the nation's STEM professions, academic programs, and research laboratories, as competitive, contributors to their disciplines, and as JSU STEM alumni who will embrace growth, service, and commitment to their communities across their careers.

**NC - North Carolina Central University**  
Durham, NC  
Institutional Grant  
P120A190041

#### Abstract

This application addresses *Competitive Preference Priority 1*  
It also addresses aspects of Competitive Preference Priority 2

North Carolina Central University (NC Central/NCCU) proposes “*A Multifaceted Approach to Comprehensive Institutional STEM Enhancement*” through research-based teaching practices, enhanced curriculum infusing data science and improving the infrastructure to strengthen STEM pathways to provide useful skills in data science, and positively impact persistence, and graduation of students, particularly underrepresented students. This project will contribute to broadening participation in STEM by serving a student population at NCCU that is 83 percent African American and 63 percent female.

The strong inter-institutional relationship between NCCU, Josephine Dobbs Early College High School (JDECHS) on the campus of NCCU, a growing relationship with Durham Tech (a community college located in the proximity of NCCU campus) is part of our cohesive system that integrates pathways into STEM for our students: 2/HS-to-4-year (NCCU) degree or a 3+2 degree program that leads to a Mathematics or Physics degree from NCCU and Mechanical/Electrical/Computer Engineering degree from North Carolina State University.

We plan to achieve the guiding goals of the project through the following objectives: Enhance teaching to align better with evidenced-based successful practices; Provide essential data science skills; and Improve institution’s infrastructure and interinstitutional STEM pathways in ways that support student persistence in STEM majors. We seek to strengthen partnership with the local community college to align course-taking pathways that allow community college students to transition to NCCU on track to graduate within two years; implement guided-inquiry laboratory; infuse problem-based learning in the STEM courses; expose our undergraduates to STEM research through affinity research groups and undergraduate research experiences; and implement active learning instruction with learning assistants. We will incorporate data science into courses at all levels in undergraduate program; implement data science projects using a problem-based learning model, provide faculty development in data science, and develop, translate and provide navigational resources. This project will strengthen academic and career advising support, provide opportunities for bolstering student connectivity, develop mentoring and networking activities, and design multiple methods for supporting student learning (e.g., learning communities, professor-led study hall, peer tutoring).

**NY - Mercy College**  
Dobbs Ferry, NY  
Institutional Grant  
P120A190048

#### Abstract

Mercy College, a private, federally designated Hispanic-Serving Institution with campuses located in NY, has developed a comprehensive three-year MSEIP Institutional Project, **Help, Excite, Lead, Perform in STEM (HELP)**. HELP will address both:

**Competitive Preference Priority 1**, to promote innovation and efficiency, streamlining education with an increased focus on improving student outcomes, and providing increased value to students and taxpayers; and

**Competitive Preference Priority 2**, to foster knowledge and promote the development of skills that prepare students to be informed, thoughtful and productive individuals and citizens.

Mercy College's project will build on offerings developed through our most recent MSEIP grant (2014 – 2017) and expand significantly on them. HELP is designed to increase the enrollment, retention, persistence and degree completion of minority students (especially minority women) enrolled in four STEM majors at the College: Computer Information Systems, Computer Science, Cybersecurity, and Mathematics. HELP will provide: 1) the HELP-M3C Summer Program for Minority High School Students to an all new group of 25 regional high school students each summer throughout Project Years I-III, and will include workshops on financial literacy (Competitive Preference Priority 2); 2) Peer Led Team Learning in Foundation Courses for STEM Success, involving the redesign of three courses based on a PLTL model that will offer students a more collaborative learning experience supported by technology and greater one-on-one interaction with peer leaders (Competitive Preference Priority 1); 3) HELP Club, a new club to serve minority students in the four majors that will offer a large range of activities such as collaborative work, leadership development, speakers, time management, student resources, career opportunities, graduate admissions information, and workshops on financial literacy (Competitive Preference Priority 2); 4) professional development in mathematics for 4th and 5th grade teachers in Yonkers, a large high-needs district with nearly 76 percent minority students; and 5) a HELP Advisory Board to offer professional guidance on the project, to include the Project Director, a HELP faculty member, the Dean of the School of Liberal Arts, a Math educator from the School of Education, the Director of Mathematics in the Yonkers School District, and professionals drawn from regional STEM focused corporations.

HELP's design has been informed by national research on minority students in STEM and has been developed by a faculty team led by the Project Director. It will foster a sense of belonging and community for underrepresented students, and its five objectives are expected to enable students in the target population to achieve success in STEM and also engage the wider community in STEM education. The success of HELP participants will also be supported by many services currently in place at Mercy College including career preparation activities, STEM internships, articulation with community colleges, and facilities such as computer labs and learning centers. An Evaluation Plan has been designed for HELP and will include performance measures along with baseline data and benchmarks to monitor progress guided by an external independent evaluator and overseen by the Project Director.

**PR - Inter American University of Puerto Rico – San German**  
San Juan, PR  
Institutional Grant  
P120A190062

#### Abstract

The Inter American University of Puerto Rico has designed an Institutional project for its San Germán and Bayamón Campuses, and hereby proposes to join forces to develop a new Professional Certificate in Data Sciences Program. An initiative through faculty development, online curriculum development and student involvement in Data Science projects obtained through a strengthened partnership with government, industry and non-profit organizations in Puerto Rico. This intra-institutional collaboration effort is enriched by many layers of mentoring that introduce experts from prestigious institutions to guide the HSI faculty, that in turn mentor the students on state-of-art methods and skills related to the growing data science field. The local impact of these Hispanics-serving campuses individually is expanded through the collaboration between BYC and SGC to serve jointly most of the island. In this way the MSEIP grant has the opportunity of developing a higher capability in Data Science knowledge with ambassadors throughout the island. Moreover, the bilingual online learning strategy serves Hispanics and students everywhere, particularly minority women, to better prepare for the 21st century workplace. The three goals of the project are:

**Goal One:** Develop cooperative mechanisms between IAUPR San Germán and Bayamón campuses that will promote efficient resource sharing, improved delivery of educational services and a streamline design in a new Professional Certificate in Data Science (DS), including course revisions and development of online bilingual courses to facilitate access and timely completion of professional and distance-learning students for national workforce development.

**Goal Two:** Develop and implement a Professional Development on Data Science Summer Institute that provides interaction and feedback between consultants, faculty and students, equips participants with state-of-art Data Science methods, tools and analysis, to increment data driven knowledge in diverse areas such as: business administration, science, and engineering.

**Goal Three:** Design, write and submit to the Academic authorities a new proposal to offer an online learning Professional Certificate in Data Science in close collaboration with government, industry and non-profit groups

## **PR - Universidad del Sagrado Corazon**

San Juan, PR

Institutional Grant

P120A190043

### Abstract

**Project Goals:** Universidad del Sagrado Corazón (Sagrado) based in San Juan, PR proposes **Empowering STEM at Sagrado (ESTEMS)** to the U.S. Department of Education's Minority Science & Engineering Improvement Program (MSEIP) with the overall goal to improve student retention in STEM programs across various disciplines in its Natural Sciences Department.

ESTEMS overall goal is divided into four sub-goals: Goal 1: to enhance student engagement and attitudes towards mathematics; Goal 2: to change the STEM educational journey by incorporating involvement and practice in hands-on internships and research activities; Goal 3: to adopt digital technologies that enable improved learning, increased exam grades, and increased course pass rates; Goal 4: to develop Sagrado's faculty into a competitive, relevant, up-to-date cohort of STEM educators.

**Target Population:** The target population for ESTEMS is approximately 150 minority men and women first, second, and third year STEM undergraduate students at Sagrado needing to fulfill their math requirements for a major within the Department of Natural Sciences. Sagrado serves a diverse population of 4,795 undergraduate students, approximately 60 percent of whom are women.

Sagrado students have significant financial need: 60 percent has an annual family income of less than \$24,000, 80.8 percent receive financial aid, 64.3 percent of students receive Pell Grants, and 41 percent receive Federal student loans.

**Proposed Activities:** Activities for Goal 1 are to develop and pilot a new course for mathematics education based on the principles of entrepreneurship and real-life problem-solving. Activities for Goal 2 will improve internship and research opportunities as part of the undergraduate experience of STEM students through SAGRADO CAREERS and will increase the number of STEM students participating in research and poster competitions. Activities for Goal 3 include a lecture-capturing system that will be installed for critical mathematics courses showing the highest failure rates, development and implementation of active-learning pedagogical technologies, and upgrading five classrooms to become state-of-the-art technological centers for STEM education. Activities for Goal 4 include a comprehensive three-year plan for faculty development in key aspects of STEM capabilities.

**Anticipated Results:** Anticipated results include: creation of innovative and active-learning Mathematical Entrepreneurship (E-Math) course; 10 percent retention increase between second and third year, and between third and fourth year; 20 percent improved student satisfaction and engagement in Sagrado's STEM program; 50 percent increase in the number of internships and/or research experiences; creation of a yearly event, Research Day; installation of live recording & tech classroom prepared for five courses; improved STEM faculty satisfaction and engagement; 10 STEM faculty trained in the new E-Math course, SBIR and grant writing, Virtual Reality and GIS for STEM teaching.

**Competitive Preference Priorities:** ESTEMS addresses both Competitive Preference Priorities: CPP1: E-Math (Innovation & Improvement in the Delivery of Educational Services) & CPP2: SAGRADO CAREERS-STEM (Financial Literacy; Personal Financial Responsibility).

**PR - University of Puerto Rico in Ponce**

Ponce, PR

Institutional Grant

P120A190095

Abstract

The University of Puerto Rico in Ponce presents the project GET by STEM II: MSEIP Continuity Cycle (GbS). GET by STEM stands for Girls Engineering Trip by visiting STEM related disciplines industries across the island. According to the U.S. Department of Agriculture's Animal and Plant Health Information Service, Puerto Rico (PR) is the third leading region in the U.S. for plant biotechnology research. Furthermore, according to the Puerto Rico Industrial and Development Company, PRIDCO, twelve of the top twenty pharmaceuticals and biotechnology companies around the world have manufacturing operations in PR. Seven of the ten selling medications in the world are produced in PR. These major industries are based on STEM foundations like aerospace, pharmaceutical, biotechnology, medical services, information technologies, electric/electronics, knowledge services, and apparel. Taking advantage of these facts, the Department of Engineering (DOE) of the University of Puerto Rico in Ponce (UPRP) has developed the MSEIP project GET by STEM. GbS relies in the creation of a group of college female students to visit at least 180 public and private high schools (impacting over 10,000 high school students) during the project's period for recruiting not only for the DOE, but all the STEM related disciplines and to participate in the GbS Camp. **These numbers will be achieved by the MSEIP Continuity Cycle, a promoting innovative strategy with wide reaching recruiting technique (Competitive Priority One).** Finally, the GbS Camp will provide to high school female students with hands-on experiences in engineering, science, technology by assisting to the scientific intimacy of all of these industries. A road trip visiting STEM related industry across the island (STEM over Wheels), warmly welcomed, and nurtured only by female professionals of these industries. GbS will be the second MSEIP GET by STEM project resulting in a new generation of well-educated Hispanic females to be prepared for sciences, specifically in the engineering, mathematics, physics, biology and biotechnology fields.

**PR - University of Puerto Rico in Ponce**

Ponce, PR

Institutional Grant

P120A190102

Abstract

The University of Puerto Rico in Ponce presents the project ET<sup>2</sup> (ET square). Engineering Tools for Engineering Technicians. ET<sup>2</sup> proposes to implement actual engineering software tools to the engineering technician's curricula in order to improve and motivate the technical workforce, but especially to increase the female population's retention and graduation rates. To accomplish these goals, the project will update all the engineering technician syllabuses to include real world applications with engineering tools like MathCAD, Matlab, Mathematica, Structure Point, among others, and equipped the MSEIP Computer Center with these applications. Furthermore, we propose to create a Computer Oriented Learning Space (COL Space) to provide female students with a collaborative space, centered and focused on STEM disciplines with physical and virtual environments, a welcoming and engaging atmosphere, with a team problem solver approach to applications, equipment, and computer languages solutions. These actions will result in a full engineering computer center providing for both teaching and hands on experiences with real world applications through the state of art software, technology and machine language. We expect that the successful completion of this project will result in more attractive profession to female students, will reduce the attrition rate, and increase the percentage of students finishing their degree requirements within the stipulated period. Unfortunately, there is no machine language or computer language course in the Engineering Technology programs and it is very difficult to add a new course in the already compress two-year programs. We think, we can provide knowledge in these engineering tools directly on each course by means of adding a Real-World Application with Computer Languages section in each syllabus. We cannot predict the future, but we do know that the future will be focused on machine learning and computer languages in all STEM careers.

**PR - Universidad Ana G. Mendez, Recinto de Carolina**  
Carolina, PR  
Institutional Grant  
P120A190047

#### Abstract

The main goal of the proposed MSEIP project “*Increasing Recruitment and Improving Retention of Underrepresented High School Students in Science and Engineering Programs in Puerto Rico*” is to recruit and retain underrepresented high school students, especially women, in Science and Engineering career pathways. This project seeks to impact 60 high school students from rural areas close to Universidad Ana G. Mendez, Carolina Campus (UAGM-CC) in Puerto Rico. This project complies with the MSEIP Competitive Preference Priorities 1 and 2 with the following objectives: (1) to establish a Mathematical Dual Enrollment program that will increase the quantitative reasoning competency in underrepresented high school students, especially women; (2) to implement a student retention program that would enhance the educational experience in Science and Engineering which will include workshops in financial literacy, leadership and self-efficiency; and (3) to create a Summer Camp Program for high school students that would engage them in a variety of Science and Engineering activities on and off-campus. Moreover, this proposal also includes a fourth objective which is *the creation of a Professional Science Master’s (PSM) Degree program with two concentrations: in Biomedical Laboratory Management and Biotechnology*, and in such, meeting the expectations of the MSEIP Invitational Priority.

The proposed project is expected to (1) increase by at least 60 percent, the recruitment of underrepresented high school students, especially women, that have interest in studying a Sciences and Engineering discipline; (2) collaborate with rural high schools nearby UAGM-CC, by providing a successful bridge program and educational Sciences and Engineering-related activities to its students; (3) retain at least 70 percent of the impacted students in areas of Science and Engineering by promoting their admission to the SC & T at UAGM-CC or any other institution of higher learning in PR; and (4) increase the graduate academic offerings with a new PSM degree at the SC & T.

## **SC - Benedict College**

Columbia, SC

Institutional Grant

P120A190061

### Abstract

Benedict College is a leader in science education amongst HBCU's and has a great history of success and graduation of academically under-prepared minority students and underrepresented groups in STEM. It is the only HBCU in South Carolina with bachelor's degree program in engineering and second to offer environmental engineering amongst all schools in South Carolina with demonstrated capacity to mentor and educate minority students majority of whom are women into successful professional careers in STEM. We propose a comprehensive academic enrichment program to increase STEM retention, graduation, and placement in professional and graduate programs.

The three project objectives include:

- a) STEM academic enhancement center for early academic intervention, mentoring and tutorial of low performing students;
- b) STEM Academic Support Center: BC STEM Success Center and peer tutors for academic support and tutorials mentorship for low performing students;
- c) STEM Scholarships for high achieving students: STEM Scholars summer research experiences at Benedict College, University of SC, and Savannah River Nuclear Site and peer mentoring for graduate and professional careers.

The program will offer tutorial and mentorship in STEM gate keeping courses to low performing students through the STEM Success Center, and research, graduate and professional school shadowing to high achieving STEM scholars over three-year period to strengthen their research and graduate school preparedness. These high achieving STEM mentors will also serve as peer tutors to low achieving students in our gate keeping STEM courses for broader impact and a necessary multiplier for increasing our STEM retention, graduations rates, professional and graduate school placement. All participating juniors will be required to take pertinent GRE and other qualifying national exams, graduate school and professional placement exams required for STEM careers and graduate and professional education. Our project will also assist our graduates with the knowledge base necessary for the job market drivers, research and hands-on competencies, and enhance their career opportunities. It will foster new research experiences with collaborating faculties and scientist at national laboratories and assist with new pedagogies in instruction amongst our faculty members and the utilization of laboratory technology in teaching and learning.

### **Competitive Preference**

The proposed project addresses competitive Preference Priority I mostly by implementing comprehensive and integrated academic support services with applicable technology tools, peer tutorial, and comprehensive academic mentoring to support success in STEM education by increasing retention and graduation rates. The program will also provide research opportunities and scholarships to high performing minority students and graduate school shadowing at Benedict College, University of South Carolina and national lab.

**SC - South Carolina State University**

Orangeburg, SC  
Institutional Grant  
P120A190106

Abstract

South Carolina State University is applying for the Minority Science and Engineering Improvement Program's (MSEIP's) Institutional grant for STEM disciplines through the U. S. Department of Education (DofE) to develop an interventional program for the under-achieving STEM students in the College of Science, Mathematics, Engineering and Technology (CSMET).

Data of the graduation rates for STEM disciplines for a five-year period (2008-2012) show that:

- 1) The graduation rates are low in all majors ranging from zero to about 40 percent for most of the years in the data which shows that the graduation rates for students graduating in six years or more in the STEM disciplines are very high.
- 2) Of the majors listed, Biology consistently has the highest rate but for 2008 for students who graduated in their original majors.
- 3) The rate drops significantly from the life science (Biology) to the pure sciences, engineering and technology disciplines.

In order to reduce the graduation time for the STEM students to less than six years, an interventional program will be developed.

The "Weekend Academy Interventional Program" (which include Summer Bridge, Fall & Spring weekends) will seek to augment the regular semester class instructions in mathematics. This program will involve a structured instruction in College Algebra and Trigonometry during Summer before the beginning of the Fall semester and the weekends (Saturdays) of the semesters. These theoretical instructions in mathematics will be complimented with practical experience in the use of scientific software. Accordingly, exercises in the software, "MAPLE", "MATLAB", PSpice, and any other mathematical software package will be used to give the students a better appreciation in the manipulations and the simplification process of complicated expressions.

For a further experience in the use of science and mathematics, the students will be introduced to 3-D modeling, AUTO-CAD and the application of 3-DPrinters in the design and manufacture of simple objects. The project activities in this program will run between 9:00am and 1:00pm on Saturdays. The instructions will be conducted by the faculty of the Civil, Mechanical Engineering Technology and Nuclear Engineering Department (CMET&NE).

This project addresses Competitive Preference Priority One: Promoting Innovation and Efficiency, Streamlining Education with an Increased Focus on Improving Student Outcomes, and Providing Increased Value to Students and Taxpayers.

**TX - Texas A&M University - Kingsville**  
Kingsville, TX  
Institutional Grant  
P120A190085

#### Abstract

Texas A&M University-Kingsville (TAMUK), a public, Minority-Serving Institution with 67 percent Hispanic student population, proposes a transformative project (REFLEX-ME) focused on improving student learning outcomes, educational benefits, and awareness and knowledge of financial literacy and professional development for TAMUK engineering and science minority students, especially women. The REFLEX-ME project is centered on improving students' quality of work in STEM curricula, career awareness and readiness, and financial literacy through three core activities: **Capstone Design Enhancement (CDE)**, **Summer Research Internship (SRI)**, and **Financial Literacy and Professional Development (FLPD)** programs.

The goals of the REFLEX-ME are to: 1) Enhance TAMUK engineering and science students' interests and performance in their curricula and preparedness for future careers through streamlined education, and 2) Improve TAMUK engineering and science students' professional and personal skills to become responsible and productive citizens. The project will expand its reach by enhancing capstone design experiences of senior students, who will share their learning experiences with freshman students in a university success course. The SRI will impact TAMUK sophomore and junior students and community college students through an intensive three-week program focused on integrated research and internship experiences. The FLPD will be seamlessly integrated into the CDE and SRI programs to help TAMUK minority students to become informed, thoughtful, and productive individuals. REFLEX-ME will directly impact over 1440 students over three years. Strong institutional support and a plan for sustainability will guarantee a long-lasting impact at TAMUK. The REFLEX-ME project is responsive to the Competitive Preference Priorities 1 and 2, and the Invitational Preference Priority.

**TX - The University of Texas at El Paso**  
El Paso, TX  
Institutional Grant  
P120A190082

#### Abstract

The University of Texas at El Paso, a minority-serving institution, proposes a Minority Science and Engineering Improvement Program institutional project entitled *YES, She Can: Closing the STEM Hispanic Gender Gap* focusing on innovations to improve Hispanic female student success. As a nation, only 29 percent of women are in the STEM workforce; and UTEP's number of undergraduate female STEM student graduates is a tawdry 19 percent, markedly lower than the national average of women in STEM careers. The need for change is readily apparent to support US industry's acuity that diversity drives innovation.

With this in mind, the *YES, She Can* project has five goals: (1) Increase STEM female undergraduate and graduate enrollments; (2) Increase participating female students' interest and academic success in STEM; (3) Improve STEM curricula through faculty development and innovative research experiences for participating students; (4) Expand and strengthen Professional Science Master's Degree programs; and (5) Increase students' knowledge about higher education financing, and skills in personal financial literacy and responsibility. These goals are to be achieved using innovative course development plus engaging implementation and through concurrent course enrollment promoting professional skills acquisition required for 21st century STEM workforce competencies. Moreover, the *YES, She Can* project provides a research-based mentorship program interwoven with confidence building activities planned to enhance inherent student strengths. Faculty mentorship and a student created and managed UTEP Women in STEM learning community will serve as supports for our UTEP *YES, She Can* students. In turn, our students will reach out to two area high school young women's academies serving as near-peer role models and mentors.

**TX - The University of Texas at El Paso**  
El Paso, TX  
Institutional Grant  
P120A190023

#### Abstract

The ubiquity of technology has continually advanced over the last decade and now demands software engineers who have the technical and professional knowledge and skills to effectively work in a teaming environment. While the technical computing workforce being hired by the software development industry sufficiently possess technical skills, by and large the workforce lacks the professional skills (“soft skills”) to work effectively in this fast-paced market. These skills include the ability to adapt to change, to learn new skills, and to work effectively in a diverse team.

Thus, the goals of the program are to (1) improve Hispanic computer science undergraduate student outcomes through augmentation of their set of professional skills, meeting Competitive Priorities 1 and 2; and (2) support the pedagogical and professional growth of faculty, especially computer science faculty) and learning assistants who can effectively support student professional growth. The proposed activities include (1) the development of a create a series of 1-credit hour courses designed to challenge the knowledge, skills, and abilities of students, primarily Hispanic students, in order to position them to thrive in the computing workforce; (2) ethnographic research to understand the factors leading to skills development; and (3) professional development of faculty and learning assistants to effectively deliver the courses in computer science.

The anticipated results of the project are (1) creation of a learning community of Hispanic computer science undergraduate students who actively seek opportunities to improve their interpersonal/professional skills; and (2) faculty and learning assistants who understand how to effectively deliver courses and other supportive actions to create a strong sense of belonging among computer science students, leading to higher retention and graduation rates of computer science students.

**TX - University of Houston - Downtown**  
Houston, TX  
Institutional Grant  
P120A190069

#### Abstract

The UHD *Enhancing STEM Success* project aims to enhance the four-year college experience primarily for first-time-in-college (FTIC) freshman undergraduates majoring in science, technology, engineering, and mathematics (STEM). The project also aims to build long-term capacity at UHD (an HSI and MSI institution) to support barrier course performance, first- and second-year retention, and increased persistence leading to graduation within six-years. Historically, STEM majors, particularly minorities and females, have experienced barriers upon entering STEM education, such as: difficult transitions into the rigors of university study, low levels of assimilation associated with non-completion, costs of education, and building relationships early in their collegiate career. By using a curricular and co-curricular approach of student support strategies, the project will address many of the barriers through six categorical support strategies including: 1) Freshman Upstart; 2) Academic Skill Monitoring; 3) Mentoring; 4) Career/Research Skill Development; 5) Leadership /Teamwork Development; and 6) Financial Literacy Skill Development.

A special focus on recruitment, increasing enrollment, and mentoring of females and minorities majoring in STEM is a critical component of the project. The project strives to bring financial literacy to STEM and other undergraduates through workshops by experts and through freshman curricular outlets, thereby increasing the financial responsibility of UHD undergraduates and graduates.