

**Project Abstracts for
Fiscal Year 2017
Minority Science and Engineering
Improvement Program**

New Awards

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FL - Miami Dade College
Miami, FL
Institutional Grant
P120A170020

ABSTRACT

Miami Dade College West Campus's STEM+METS project will improve its capacity to attract, enroll, and retain minority students and women in STEM programs of study. The *Science, Technology, Engineering, and Mathematics for Minorities and Engaging Teaching Strategies* (STEM+METS) three-year institutional project will target high school students and freshmen from minority groups. The project has identified three important goals: (1) increase the enrollment and retention of declared STEM majors, (2) develop a culture of inquiry and experiential learning through professional training and development for faculty and students, and (3) create a supportive and modernized learning environment.

Since the West Campus primarily offers associates degrees, the project seeks to expand the STEM pool through early engagement, academic support in introductory STEM courses, experiential teaching techniques, STEM faculty involvement and community building. STEM+ METS will develop student leaders through its Accelerated Science Education (ASE) Summer Program and Student Ambassadors program. Students who exhibit high levels of initiative and dedication as Student Ambassadors, Student Leaders, and tutors will participate in specific trainings and activities to maximize their own learning and those of their peers.

Project objectives include: (1) increase student engagement and exposure to science and engineering fields through pre-matriculation activities and participation in STEM community building activities; (2) improve academic supports in STEM by enrolling 20 high school (rising seniors) each year in the Accelerated Science Education (ASE) Summer Program, (3) increase the pass rates in high risk gatekeeper mathematics course (MAT 1033-College Algebra) to 70 percent by the third year of the project; (4) increase by 20 percent the percentage of students retained in STEM programs of study from fall of one year to fall of the subsequent year; and (5) promote teaching and learning in STEM by establishing a STEMovation and Creative Space to support faculty and student professional development.

Attainment of these objectives will occur through the following activities: outreach and engaging STEM activities, faculty advising, professional development of students and faculty, peer tutoring/mentoring, ASE Summer Program, freshmen interest groups/learning communities, research experiences, curriculum enhancements, renovation of STEM facilities, student life skills training, and career related activities.

STEM+METS addresses the competitive preference priority, "Promoting Science, Technology, Engineering, and Mathematics (STEM) Education."

KS- Donnelly College
Kansas City, KS
Cooperative Grant
P120A170117

ABSTRACT

The Kansas City region has a recent history of encouraging participation by underrepresented minority youth in programs to expose them to STEM careers, including engineering. The engineering sector is experiencing significant growth in the region and has the potential to provide well-paid professional careers for low-income, minority students if they can persist in obtaining a bachelor's degree. However, exposure to engineering careers has thus far not led to a substantial increase in underrepresented minority students completing a bachelor's degree. To address this challenge, *Pathways to Engineering Careers* (PEC) will bring together two urban higher education institutions, Donnelly College (offering primarily two-year programs) and the University of Missouri-Kansas City (UMKC), a four-year research institution, to create a seamless approach to attracting underserved urban minority and minority female students into a rigorous bachelor's-level engineering program as well as to supporting these students through completion of their degrees. The overall goals of PEC align with the goals of the MSEIP: 1) to effect long-range improvement in science and engineering education at Donnelly College, a primarily minority institution, and 2) to increase the flow of underrepresented ethnic and racial minorities, particularly minority women, into bachelor's degree programs in UMKC's School of Computing and Engineering.

Donnelly and UMKC are working cooperatively on this project because the administration and faculty at both institutions realize how crucial it is for the regional economy and for urban young adults to have improved access to educational and economic opportunities. PEC will allow both institutions to capitalize on their strengths and to address their weaknesses in ways that will benefit minority and minority female students, while also helping meet the region's projected need for engineers.

The project's target population is underrepresented minority students, including minority females, who score slightly below the cutoff for admission to UMKC's engineering program (25 ACT math/24 ACT composite) and have interest and aptitude for engineering as expressed by participation in secondary-level STEM activities. These students will spend their first one to two years in a structured pre-engineering program at Donnelly and then will seamlessly transfer into UMKC's School of Computing and Engineering to complete their bachelor's degrees.

Key project objectives:

1. Increase enrollment of underrepresented minority students in Donnelly College STEM programs.
2. Improve the academic preparation, achievement and persistence of underrepresented minority students in foundational pre-engineering courses at Donnelly College
3. Improve the transfer rate of underrepresented minority students from Donnelly College to UMKC's School of Computing and Engineering.
4. Improve the retention rate of underrepresented minority students in the bachelor's degree in science and technology at UMKC's School of Computing and Engineering.

MD - University of Maryland – Eastern Shore
Princess Anne, MD
Institutional Grant
P120A170068

Abstract

The University of Maryland Eastern Shore (UMES) is a historically black, 1890 land grant university with a strategic aspiration to become a major research university. UMES requests funding from the USDE, under the MSEIP Program, for '*INSPIRE STEM Students*' Institutional Project, an initiative between UMES, 4-H, a global non-profit youth organization, and Houston University (HU), a tier one research university. The purpose is to take a fivefold holistic approach to synergize (1) recruitment (2) retention (3) increasing student engagement (4) capacity building and (5) increasing student potential for innovation.

Our goal is to recruit more high school minority students, particularly women, into college level science, technology, engineering, and mathematics (STEM) majors. Partnership with 4-H will pave the way to build a pipeline for more at-need students through outreach events from the neighboring counties. We would address Competitive Preference Priority by integrating laboratory and tutorial ('laboratorial') in a hands-on active learning environment to increase students' learning outcome. An interactive classroom will also be created where modern technology will be incorporated into classrooms as assistive technologies via clicker apps, interactive animations etc.

To increase students' research potential, UMES is collaborating with HU where undergraduate students of UMES will get an opportunity to do summer research at HU and continue it for the rest of the semesters at UMES under UMES faculty members. Building a Nano-Therm lab in the model of HU, joint supervision of students, regular faculty meetings between two institutes and collaborative publications will serve the purpose of capacity building, improving student research potential and faculty development as a whole.

Funding requested will be used towards project staff salaries, teacher and student stipends, educational materials, research equipment and travel. UMES will provide institutional support to the project in the form of staff release time, facilities, and administrative resources.

MS- Hinds Community College – Utica Campus
Utica, MS
Special Project Grant
P120A170097

ABSTRACT

Hinds Community College – Utica Campus (HCCUC) proposes project: *Women Interested in STEM at HINDS (WISH)* as a special project grant that is designed to assist HCCUC with activities that improve the quality of training in science and engineering at HCCUC and to enhance the HCCUC's general scientific research capabilities. The overarching goal of Project WISH is to effect long-range improvement in science and engineering education at HCCUC and to increase the flow of underrepresented ethnic minorities, particularly minority women, into scientific and technological careers.

The objectives of Project WISH follow two of the specific objectives of the MSEIP program to ensure a high quality STEM workforce.

- Objective 1: Improve access of minority females in undergraduate science and engineering through community outreach programs.
- Objective 2: Improve the quality of preparation of females for careers in science, technology, engineering and mathematics (STEM) and graduate work.

Project WISH will last three years and aims to engage up to 20 adult volunteers with keen interest and relevant multi-disciplinary expertise from academia and industry to guide, mentor and fully engage up to 90 minority females (42 high school females and 48 postsecondary females) and introduce up to 300 females at eight high schools in two low poverty Mississippi school districts and HCCUC to STEM education and careers in two settings: in school and out- of-school. Through this project, HCCUC proposes to grow the pipeline of female students who are aware of STEM educational pathways and career opportunities. Specifically, Project WISH will support relationships between high school females, community college females and community college females transitioning to a 4-year minority institutions, using the near-peer developmental model and psycho-social and emotional supports covering diversity, gender, and economic issues as ways to increase the number of female students through the STEM education and career pipeline.

A partnership with Jackson State University (JSU) and business(es) and other community partners will help enhance the development of authentic classroom and field-based experiences that serve to build female students interest in STEM-related fields and occupations are the focus areas for Project WISH. Over the three years of the grant period, the project will complete the following four activities: (1) WISH Summer Internship; (2) After-School and Saturday Science Fair Project Assistance; (3) Fall WISH Assembly and (4) Spring STEMcation. The anticipated results include: (1) increased percentage of female students' awareness of career opportunities in STEM and related fields; (2) increased percentage of female students motivated and prepared to pursue STEM educational pathways; (3) increased percentage enrollment of full-time undergraduate female students; (4) increased percentage persistence of full-time minority female undergraduate students; and (5) increased percentage graduation of minority female undergraduates who graduate within three years of enrollment.

MS - Jackson State University
Jackson, MS
Special Project Grant
P120A170075

Abstract

Jackson State University's Department of Physics, Atmospheric Sciences and Geoscience (PASGS) and Mississippi Science Partnership (MSP), whom specialize in science, technology, engineering, and mathematics (STEM) human resources development areas, will implement this project. This grant proposal for Project MARRS OP builds on the successes and lessons learned over the last eight years through Mississippi Academy for Science Teaching (Project MAST), and provides authentic learning experiences for teachers. The primary goals of this project are to: (a) improve student achievement, (b) improve recruitment and retention; (c) create a sustainable pipeline of students to Historically Black Colleges and Universities (HBCU) STEM programs by improving teacher quality and instruction quality in science classrooms, and (d) to improve student's college and career readiness. This project targets teachers and students (grades 6-12) from four specific school districts who yielded the lowest state assessment scores. These scores were given to districts by Mississippi Department of Education regarding their accountability in the state for the 2015-2016. These school districts are: Holmes County, Jackson Public, Canton and Yazoo City Municipal School Districts.

The key features of this project are manifested in six objectives designed to guide its efforts as follows:

- a) Increase teacher content knowledge in physical, earth, and space science, and improve teacher practice, and science content enactment;
- b) Improve teacher adaptations of curricula;
- c) Increase the integration of technology;
- d) Improve teacher practice, and science content enactment;
- e) Increase school administrators' knowledge of the benefits of such programs and increase support for sustained science professional development for physics, earth, and space science teachers; and
- f) Create a pipeline to improve recruitment and retention (particularly minority females) at HBCU in STEM.

Through this project approximately, 60 teachers and 6000, 6-12 grades students, directly and many more indirectly will be impacted.

MS- Mississippi Valley State University
Itta Bena, MS
 Institutional Grant
 P120A170085

ABSTRACT

Mississippi Valley State University is located in the heart of the Mississippi Delta, which is one of the most underserved and underrepresented areas in the state and, indeed, the nation. This proposal titled, “*STEM CHANGERS: Customized High- Quality Approaches Necessary to Graduate, Excite, and Retain STEM Students,*” will address the Competitive Preference Priority-Promoting Science, Technology, Engineering and Mathematics (STEM) Education by implementing a program for elementary and middle school girls in grades 6 to 8 and improving and strengthening structures for post-secondary education.

Program activities will be employed to strengthen practices and create a pipeline from elementary school to college. The overarching goal of this program is to increase the awareness of STEM education among minorities, especially women, while creating pathways for students to earn bachelor’s degrees in a STEM field. Three initiatives will be utilized to address the demand for STEM graduates:

Initiative	Goal
Research Faculty Student Partnerships	To strengthen students’ research skills in STEM disciplines and to increase recruitment and retention through research experiences and mentorship
Secondary K-12 GEMS Academy	To provide training and support systems essential to impact achievement and interest of middle school students in STEM, specifically mathematics
Retention Summer Bridge	To increase the retention and graduation rate among minorities in STEM programs through mentoring, tutoring and academic support

Program activities will include a strong retention initiative that will provide faculty- led tutorial services in gatekeeper courses for undergraduates. The proposed activities align with the University’s mission and the competitive preference priority of the U. S. Department of Education to produce more STEM graduates for the workforce. Proposed project activities will be conducted by qualified STEM faculty and the administrative team.

NC- Johnson C. Smith University
Charlotte, NC
Institutional Grant
P120A170070

ABSTRACT

Literature suggests African American and female students were less interested or exposed to science and engineering compared to other ethnic groups. To meet the national needs of producing more STEM professionals and increasing STEM graduates, and encounter the challenges of declining computer science and engineering majors at our university, this proposed project aims to increase the number of minorities, in particular, African American, and female students prepared for technological and engineering careers. Johnson C. Smith University seeks to develop students' confidence, motivation, technical skills, and 21st Century Skills.

This project will focus particularly on Student Transitions (pre-enrollment through sophomore year) with an underlying robust engagement system in Computer Science & Engineering. 1) With the MSEIP project there will be a Computer Science Summer Institute Extension Pilot Site exposes low-income and potentially first-generation minorities and women to computer science and its impact on society. 2) There will be the development and implementation of the College Board's Computer Science Principles Framework into the freshman required course (Computers in Society) where all students can understand Computer Science. 3) There will also be Experiential Learning activities linked to the entrepreneurial thinking curriculum from the NSF's Adopted Evidence Based Entrepreneurship Methodology, Lean Launchpad. Students will be able to use their collective knowledge and skills to develop solutions that would have measureable impact. 4) This MSEIP project will support faculty engagement through research and exposure, which will ultimately lead to curriculum changes and pedagogy.

As result, we expect to see an increase in the number of freshmen students selecting Computer Science as a major, improvement in the persistence and retention rates of Computer Science majors, an increase in the number of students understanding of how computer science principles can be applied across disciplines, an increase in the number of students receiving competitive computer science related internships, a completion of a framework for Career-Readiness for Computer Science related careers, and enhancement of Teaching and Learning practices across the department, college and university.

Competitive Preference Priority: Promoting Science, Technology, Engineering, and Mathematics (STEM) Education: The proposed project is designed to improve students' self-efficacy, self-management, critical thinking, technical skills and other skills for their career or graduate school preparation by identifying and implementing innovative instructional strategies and strengthening our STEM education structures.

NM - Regents of New Mexico State University
Las Cruces, NM
Institutional Grant
P120A170064

ABSTRACT

The proposed *Extending Academic Analytics: Application to Engineering Education at New Mexico State University* program aims to increase the number of underrepresented minority (URM) students earning degrees in engineering. The program will initially focus on students in the Department of Electrical and Computer Engineering (ECE) and then grow to include the entire College of Engineering. This program is motivated by the trend showing the graduate and retention rates of URM students is below that of other students, with the gap widening with time. The longer time-to-degree for URM students also results in a greater financial burden. The proactive academic intervention system, developed as part of this proposal, will provide the mentoring, supplemental instruction and encouragement needed to help students thrive academically. This will increase retention rates in engineering and promote on-time graduation.

This program is based on the *Data Analytics* model, used successfully at Georgia State University (GSU), but expanded to address the unique needs of engineering programs (not part of GSU's academic offerings). The data tools, developed as part of the program, will use a machine learning approach to develop an early warning system to identify students with the potential for academic risk. In addition to the data tools, the program includes a highly specialize intervention program with peer mentoring, supplemental instruction classes and an academic achievement visualization tool to help student track their progress and highlight potential trouble spots. The final element of the program is a rigorous assessment plan to validate the efficacy of each element of the program as related to the success of our students. The combination of the early alerts and the support program will empower students to take greater command of their academic achievement.

The College of Engineering at New Mexico State University has about 2,500 undergraduate students with about 250 in ECE. More than half of these students are from underrepresented minorities and about 15 percent are female. The *Extending Academic Analytics: Application to Engineering Education at New Mexico State University* program will impact the academic futures of a large and diverse group of students.

PR-SUAGM, Inc. dba Universidad del Turabo
Gurabo, PR
Institutional Grant
P120A170074

ABSTRACT

This institutional project addresses the competitive preference priority: Promoting Science, Technology, Engineering, and Mathematics (STEM) Education, since it is designed to improve student achievement by implementing instructional strategies that will improve retention and passing rates, resulting in completion of a degree in a STEM field.

With its mission in mind, Universidad del Turabo (UT) is evolving from a purely teaching institution into a teaching- research institution. Institutional efforts have been focused on hiring faculty with outstanding research experience and enhancing its infrastructure to support research activities. At UT, undergraduate students perform the majority of the scientific research on campus. Although these students have the competencies to stride with greatness in STEM research fields, economic constraints force them to obtain jobs that are non-related to their studies; creating an additional strain which may cut their careers goals short. TuERES (which can be loosely translated to, “You Are”) will impact the curricular content of the UT students by inserting the Entering Research Curriculum. Recognizing that UT students are English Language Learners (ELLs), the program design emphasizes developing strong reading and writing skills, with activities benefitting, not only the direct participants of the program, but also the broader STEM student body. TuERES will create a talent development program for underrepresented minorities enrolled in STEM programs at Universidad del Turabo and strives to empower students with the qualities, achievements and habits necessary for success high profile STEM research careers.

The project outcomes, upon completion of the project, are that (1) at least 70 percent of UT TuERES Scholars will have enrolled in STEM graduate programs; (2) we will see an increase in the current enrollment in undergraduate (UG) research courses; and, (3) at least 80 percent of TuERES alumni that enter graduate programs will successfully complete these.

The TuERES project will identify student talent and develop it into a high skill level by providing high quality programs to enable participants to strengthen their academic and research credentials, so that they are highly competitive for admission to top graduate programs and to be successful in them. This ambitious program challenges the student to improve. TuERES will be a major contributor to the ongoing growth of the Universidad del Turabo in research activities, benefiting undergraduate students and STEM education in general amongst Hispanics. The project will provide undergraduate students the opportunity to participate in competitive undergraduate research with the appropriate academic, financial, emotional and professional support to be successful and continue on to graduate studies. The proposed TuERES project will create a talent development program for underrepresented minorities enrolled in Chemistry, Biology and Engineering programs at UT. The proposed program will empower students with the skills, knowledge, achievements and habits necessary for success in future graduate programs, postdoctoral appointments, and into high profile STEM research careers.

TX - Dallas County Community College – Eastfield
Dallas, TX
Institutional Grant
P120A170079

Abstract

Eastfield College, where learning matters, is a public, two-year degree-granting institution of the Dallas County Community College District (DCCCD) serving the northeast sector of Dallas County, the second largest county and metropolitan area in the state, with access to high-quality academic programs in higher education. In addition to its historic location since 1970, a 40,000 square foot satellite campus (Eastfield College – Pleasant Grove Campus) opened in August of 2009 in the heart of a socially and economically depressed area. Designated a Minority Serving Institution (MSI), a Hispanic Serving Institution (HSI) and a “Military Friendly School,” Eastfield College has a history of developing educational opportunities for underrepresented populations. Nearly three-fourths (73.6 percent) of the institution’s entire student population are from minority ethnic groups where minority women students comprise approximately 61 percent of ethnic minority students at the institution. However, although minority students make up more than seventy percent of the student population, only one percent of the institution’s minority students are enrolled in science and/or engineering programs. More alarming, less than one percent of minority women enrolled at the institution are pursuing science or engineering programs of study. Additionally, although eligible to enroll in dual credit coursework, in the 2014-2015 academic year, only 17 percent of high school students, who represent the potential pipeline for STEM careers, were enrolled in and successfully completed college coursework in science.

The institution’s reliance on data collected regarding the capacity of its infrastructure relative to STEM revealed other barriers and identified needs of the institution that limit its opportunities to enhance program offerings and student success in science and engineering such as 1) limited laboratory classroom space to engage community college students in research-integrated curriculum prior to university transfer; 2) limited faculty qualified to teach courses designed for STEM majors; 3) limited resources to assure students access to STEM-centered student services personnel to provide career-integrated advising, retention and outreach for minority students; and 4) few specific articulation agreements or transfer models in science and engineering programs with four-year institutions for course transfer. With this in mind and in accordance with the Competitive Preference Priority for the Minority Science and Engineering Improvement Program (MSEIP), the overall focus of the proposed project will be to develop a plan of action designed to increase enrollment and improve student achievement of minority students in science and engineering programs by identifying and implementing instructional strategies, systems and structures that will improve postsecondary learning, retention and degree attainment of minority students’, including minority women, in STEM fields.

The proposed Minority Science and Engineering Improvement Program goals, objectives and activities will be focused on three primary components: 1) STEM awareness, exposure and connections through outreach and partnership collaboration; 2) STEM student engagement through the development of in-class and out-of-class retention strategies, services, and activities; and 3) STEM academic program enhancement through laboratory classroom expansion, faculty development, and application of cooperative learning teaching methods. As a result of successful implementation of the proposed three year project: 1) Enrollment of minority students, especially minority women, in STEM will increase; 2) STEM instruction and instructional facilities will be enhanced to meet increased enrollment as well as provide instructional strategies that encourage improvements in retention rates, persistence and graduation of minority students in STEM; and 3) Articulation agreements and partnerships with four-year institutions and industry partners to enhance minority student success after transfer or graduation will increase.

TX- Texas A&M International University
Laredo, TX
Institutional Grant
P120A170102

ABSTRACT

Texas A&M International University (TAMIU), a Hispanic Serving Institution, proposes a Minority Science and Engineering Improvement Program Institutional Project titled *Engineering and Science Improvement and Retention Enhancement (MSEIP-ESIRE)*, which addresses the Competitive Preference Priority: Promoting Science, Technology, Engineering and Mathematics (STEM) Education. This priority will be addressed through innovative outreach and retention programs to increase the number of minority students, attaining engineering degrees.

MSEIP-ESIRE has three objectives: (1) increase the number of students entering engineering majors by 20 percent each year of the program; (2) achieve an 85 percent retention rate for project participants; and (3) increase the five-year graduation rate for engineering majors, which is currently well below the 29-39 percent rate for STEM fields at TAMIU.

The project's goal will be realized through the implementation of a number of cost-effective outreach and retention activities, including outreach and enrichment workshops, student mentoring, and faculty professional development. Performance measures will include increases in: 1) the number of undergraduate engineering students, especially underrepresented minority and female students, 2) the retention of engineering students, and 3) the percentage of engineering students graduating within five years. Other annual measurable outcomes include: a) Introducing more than 5,000 minority middle and high school students to engineering career opportunities; b) Providing mathematics and engineering workshops to 120 minority students per year; c) Providing 6 peer tutors and 2 transition mentors each year to minority engineering students; d) Working towards developing agreements to increase the transfer of minority students into engineering. Increasing the participation of these students in the proposed activities is critical to broadening diversity in engineering and enhancing the nation's technological and economic competitiveness.