Project Abstracts for Fiscal Year 2020

Minority Science and Engineering Improvement Program

New Awards

AL – Oakwood University
Huntsville, AL
Institutional Grant
P120A200096

Abstract

Oakwood University is a historically black university (HBCU), founded in 1896 and providing primarily undergraduate education to 1,800 students. Oakwood University is accredited by the Southern Association of Colleges and Schools, is ISO 9001 certified, and retains a corporate structure of 501c(3). The mission of Oakwood University, a historically black, Seventh-day Adventist institution, is to transform student through biblically based education for service to God and humanity. The University is charted to operate by the State of Alabama and is governed by the Board of Trustees.

The overarching goal of this Minority Science and Engineering Improvement Program (MSEIP) grant proposal entitled Creating Opportunities for Success in STEM (CROSS): Increasing the Retention of Minorities and Women is to help students at OU to CROSS over some of the roadblocks to earning an undergraduate education and pursuing careers in STEM. By accomplishing this goal CROSS will improve the academic success and retention of females and African Americans in STEM in the U.S.

The proposal seeks to achieve the following goals:

Goal 1: Increase the number of female students enrolling in STEM programs at OU, particularly in the areas of engineering and computer science.

Goal 2: Make short- and long-range improvements in student learning success in mathematics, engineering, physics, and computer science courses and programs.

Goal 3: Make short- and long-range improvements in career placement and outcomes of underrepresented ethnic minorities and women in STEM programs at OU.

CROSS will address **Competitive Priority Two** by providing financial planning workshops for minorities and women STEM which will foster knowledge and promote the development of skills that prepare students to be informed, thoughtful, and productive individuals and citizens.

CROSS will accomplish its goals by (1) enhancing existing tutoring services through student training in mathematics, physics, engineering, and computer science (MPECS) facilitated in the MPECS Enrichment Center; (2) providing enhanced opportunities for career preparation of STEM students including financial planning; (3) enhancing the recruitment of females in STEM programs with an emphasis in engineering and computer science; (4) developing a Women's Initiative (WIN) for STEM Symposium for high school and college students to meet and interact with women working in STEM.

AL - Stillman College
Tuscaloosa, AL
Institutional Grant
P120A200045

Abstract

In 2012, about 40 percent of the students entering two- and four-year postsecondary institutions indicated their intention to major in science, technology, engineering, and mathematics (STEM). And of those students, about 50 percent failed to earn these STEM degrees four to six years after their initial enrollment. There are multiple barriers prohibiting these students from realizing their ambitions including the quality of teaching, undergraduate learning environments, course sequences, co-curricular activities, students' general academic preparedness, competence in science, family background, and institutional policies that affect STEM educational pathways. As a consequence of these factors, these students may switch to non-STEM fields or may eventually drop out of college. This trend is prevalent here at Stillman College (SC) – more so than most institutions. Many of those who do obtain a degree take longer than the traditional four-year path to a STEM undergraduate degree, thus raising the cost of their education Therefore, it behooves us to provide effective institutional programs that impact long-lasting outcomes upon these students, the institution, and other stakeholders such as parents and taxpayers.

Based on comprehensive assessments, SC is in critical need of improving its STEM disciplines for the predominant minority students at this institution. Herein, we propose an institutional program project to implement a comprehensive science improvement plan in combination with research activities for improving the preparation of minority students for careers in science. This proposed project revolves around a hands-on research experience that encourages collaborative efforts among biologists, chemists, bioengineers, and mathematicians. Then the real-world applications of such collaborative efforts will be presented by faculty members as seminar series on special topics in STEM disciplines. Undergraduate student enrolled in this program will be mentored through his or her individual career development plan. In addition, our journal club will focus on how people can work together effectively in team-based science. This approach gives students a much deeper understanding of science when actively learning.

The objectives of this project are to address two competitive preference priorities (1) promoting innovation and efficiency, streamlining education with an increased focus on improving student outcomes, and providing increased value to students and taxpayers, and (2) fostering knowledge and promoting the development of skills that prepare students to be informed, thoughtful, and productive individuals and citizens. The expected outcomes in our STEM fields are significant improvements in key performance measures such as the percentage of change in the number of full-time degree-seeking minority undergraduate students during the three-year implementation of the BREEM STEM program as compared to the average of the prior three years before the implementation. Also, we expect an increase in the four-year graduation rate and a significant reduction in the six-year graduation rate for the four-year degree seeking minority students. The BREEM STEM program will improve scientific and technical skill sets, develop critical thinking skills, and enhance professional acumen on our students. These skill sets are indispensable for career advancement in STEM fields.

DC - Howard University
Washington, DC
Institutional Grant
P120A200044

Abstract

Over the past two decades, Howard University has made remarkable progress in addressing the underrepresentation of minorities in STEM fields. For this proposed program at Howard University or the Howard University Science and Engineering Cultural Efficacy (HUSECE) Program, we will propose strategies that address the low degree production of women in the fields of chemistry, computer engineering, mathematics and statistics and physics. The females in Biology will be included as a positive control. This will be explained later when we look at the data production. We believe in order to increase the low production of degrees in all STEM fields by minorities, there must be a concerted effort by all stakeholders. Universities, government and corporate America are all stakeholders and should also be involved in the higher production of underrepresented minorities at the beginning of their STEM careers in college rather than waiting until they complete their STEM degrees at the BS, MS and PhD levels. Further, there are still a lot of issues concerning social and cultural isolation of females, especially in STEM fields, and how these feelings of self-efficacy affect their persistence in science and engineering fields. Research has shown that determining the challenges to participation and retention of underrepresented minorities in STEM is complex.

The program goals proposed for the HUSECE are as follows: **(a)** To increase the number of female students in fields of chemistry, computer engineering, mathematics and statistics and physics through recruitment and by providing incentives including one-on-one mentoring support and counseling so that they will persist and graduate in these majors; (**b)** To provide undergraduate STEM students in all majors an opportunity to work in small groups with an experienced research mentor in selected fields so that they can develop interdisciplinary approaches to solving science and engineering problems. **(c)** To provide support for a select group of students based on their performance to accompany their research mentors on international research projects with intensive REU -type of experiences and to present their technical results; **(d)** To provide support that addresses cultural and social issues that affect student's feelings of self-efficacy and feelings of belonging in the field of STEM, and to make the social and cultural factors that affect their persistence in the field so as to gauge impact on the effect of explicitness on student persistence in science and engineering. Involvement of students in research activities early in their STEM careers is one method for improving their progression and retention in their selected majors. We will also recruit female students into the low production fields of chemistry, computer engineering, mathematics and statistics and physics.

Over the period of this proposed project, we project at least a 10 percent increase in the numbers of females getting BS degrees in these fields. By bringing more females and underrepresented minorities into the scientific community of practice, we begin to change the face of science to reflect our society and culture. A new level of inclusiveness will facilitate a collective efficacy that influences individual perceptions of belongingness in science and begin to alleviate the impacts of stereotype threat. This will be done by addressing indicators of self-efficacy so that students are empowered to make the necessary changes in their learning behaviors that facilitate their own integration into the scientific community of practice.

FL - Miami Dade College
Institutional Grant
Miami, FL
P120A200005

Abstract

The Miami Dade College Eduardo J. Padrón Campus proposes a three-year institutional project designed to address the needs of minority students studying science, technology, engineering, and mathematics (STEM): *STEM Beyond.* Proposed interventions will go beyond the classroom, providing wraparound services online to students, especially minority and female students.

Project goals STEM Beyond has two goals: (1) continue instructional supports in sophomore- level courses to optimize student course pass rates, success, and degree completion or transfer to STEM baccalaureate programs; and (2) develop a comprehensive, online student support model that focuses on STEM student engagement in sophomore-level courses. Its objectives are to (1) increase the average pass rate of students in sophomore-level STEM courses by five percent more than peers not actively engaged in project activities; (2) increase the percentage of students who are transfer ready in two years by 2.5 percent; (3) enhance student STEM engagement as demonstrated by active participation in the proposed online learning community at least three times per term; and (4) improve students' sense of STEM identity by the end of their participation in *STEM Beyond*, as demonstrated by pre- and post-assessment.

Proposed activities MDC has successfully implemented interventions designed to increase the pass rates of STEM-declared students in gatekeeper science and engineering courses, which ultimately improved student retention, progression, and completion of their courses of study. However, these vital interventions often fall away as students' progress through their programs of study and enroll in more rigorous, sophomore-level STEM courses and course pass rates suffer as a result. As such, Padrón Campus proposes to implement the use of STEM peer coaches for sophomore-level STEM courses to support participants' learning in and outside of the classroom, provide dedicated discipline-specific academic advising, and establish an online student-led community of learning designed to keep students engaged in sophomore-level courses.

Target populations STEM Beyond will serve 200 students enrolled in the following sophomore- level STEM courses: Biology I and II, Organic Chemistry I and II, and Calculus I.

Anticipated results It is anticipated that *STEM Beyond* will improve academic performance in sophomore-level mathematics and science courses; decrease time to degree completion; and increase students' STEM identity.

Competitive preference priorities In response to Competitive Preference Priority 1, *STEM Beyond* will pilot a peer-to-peer coaching model that has the potential to decrease students' time to degree completion, thereby decreasing the amount of funding students, the College, and taxpayers need to contribute toward students' financial support, such as Pell grants and other financial aid. *STEM Beyond* will address Competitive Preference Priority 2 by providing participants with online instruction in personal financial literacy, knowledge of markets and economics, and knowledge of higher education financing and repayment or other skills aimed at building personal financial understanding and responsibility.

FL - Miami Dade College North Campus
Miami, FL
Institutional Grant
P120A200007

Abstract

Miami Dade College North Campus requests funding from the U.S. Department of Education, Office of Postsecondary Education, Minority Science and Engineering Improvement Program, to implement the STEM Advanced Institute for Scholastic Leadership Experience (STEM AISLE) project. The project intends to address the pressing need to increase the number and proportion of minority students, particularly women, in STEM fields who persist in and complete college or other postsecondary education.

Overarching Goal: This three-year institutional project will deploy a constellation of proven, high-impact practices to increase the enrollment, retention, success, and completion of minority and female students in STEM programs, with a special focus on engineering and technology students, and to improve their employability upon graduation. The project goals are as follows:
Goal 1: Increase the enrollment and retention of declared STEM majors
Goal 2: Develop STEM experiences through research and experiential learning opportunities for students
Goal 3: Expand the employability of STEM graduates through STEM skills training and career preparation

Target Populations: *STEM AISLE* will target minorities, and minority women enrolled in STEM programs of study at MDC North Campus, girls ages 12-18 who attend Miami-Dade County, Title I public schools, and their parents.

Proposed Activities: To successfully accomplish the goals of STEM AISLE five main objectives have been developed: *Objective 1*: Enhance the piloted STEM Institute for Scholastic Leadership Experience (ISLE) to provide more services focused on engineering and technology as well as science fields in order to increase retention of STEM majors by 10 percent. *Objective 2:* Enroll 15 STEM majors in the Summer Research Institute on a yearly basis to expand experiential learning opportunities. *Objective 3*: Provide 200 underrepresented students with tutoring, mentoring, advising, peer networking, and early undergraduate hands-on experiential learning activities. *Objective 4*: Increase the STEM employability literacy of STEM students by 10 percent. *Objective 5*: Creation of educational materials for enhancement of academic curricula.

STEM AISLE will improve the academic, professional, and "soft-skills" of STEM students through tutoring, research experiences, service-learning, internships, e-portfolios, advisement/ mentoring, a career speaker series, career and financial literacy workshops, and a STEM conference for minority girls. High achieving and motivated undergraduates who fulfill specific activities will earn the right to graduate with the Distinction in Scholastic Leadership.

Anticipated Results: The STEM AISLE project will achieve the following results: increased retention of engineering and technology majors; 450 middle- and high-school girls impacted by STEM outreach efforts; 45 students completed authentic STEM research; 600+ students receive tutoring, mentoring, and other supportive services to encourage their retention and completion.

STEM AISLE addresses ***Competitive Preference Priority 1***: "Promoting Innovation and Efficiency, Streamlining Education with an Increased Focus on Improving Student Outcomes" ***and 2***: "Fostering Knowledge and Promoting the Development of Skills"

FL - St. Thomas University
Miami Gardens, FL
Institutional Grant
P120A200104

Abstract

St. Thomas University, a federally designated **Hispanic Serving Organization** (HSI), seeks funding for a MSEIP (Minority Science and Engineering Improvement Program) institutional project entitled: **¡Si Puedo!** (I Can) – **S**TEM **I**ntegration to **P**romote **U**ndergraduate **E**nrollment, **D**egrees, and **O**pportunities.

The Goal of ¡Si Puedo! is to increase STEM enrollment and graduation of minorities and women, thereby increasing the number of underrepresented minorities and women into scientific and technological careers.
¡Si Puedo! Objectives are as follows:

1) To improve access of minority students in undergraduate and graduate science and engineering through community outreach programs,
2) To improve the quality of preparation of students for careers in science, technology, engineering, and mathematics (STEM),
3) To improve STU's capability of self-assessment, management, and evaluation of STEM programs and dissemination of results, and
4) To improve existing capabilities of STU in the areas of planning and implementation of STEM programs, therefore achieving the ability to compete more effectively in programs not specifically intended for minority groups or institutions.

The target population includes the minority and female undergraduate students STEM students, as well as area high school students and teachers.

Proposed ANNUAL Activities include: Tutoring availability for all STEM majors (up to 200 students annually); **Mentoring** for up to 100 at-risk STEM majors; **Summer Bridge Program** for 30 incoming STEM Freshmen; **First Year Experience Program** (UNI 101-STEM) for all STEM Freshmen & Transfer Students (60-80 students); **Expanded Summer Research Institute** for STEM majors (15 students); **Community Outreach & Education One**-Week Science teacher summer "Boot Camp" and modules for them to take back to classrooms (10 teachers per year),
Six-Week High School Science Fellows Summer Program (25 rising seniors/year), Bi-Monthly (six per year) for Outreach Lecture Series, bringing the community a science education program; and **Faculty development & comprehensive program planning**

Anticipated Results include:

1) Increased number of minority and female students seeking degrees in STEM. By the end of Year Three, we anticipate at least a 15 percent increase in STEM-declared enrollments.
2) Increase the exposure of teenage minority students and their families to science and technology topics and career possibilities. By the end of Year Three, we anticipate an increase in both the persistence and graduation rates of STEM students by 10 percent.
3) By the end of Year Three, we anticipate the development and utilization of a comprehensive STEM Plan that improves the capability of self-assessment, management, and evaluation, in order to compete more effectively.

This MSEIP Program will address both Competitive Preference Priority One and Two.

GA - Fort Valley State University
Institutional Grant
Fort Valley, GA
P120A200016

Abstract

The Fort Valley State University (FVSU) is Georgia's only 1890 land-grant institution, serving 93 percent African Americans underrepresented (mostly first generation) college students, with a mission to not only empower them to use education to pursue meaningful careers, but it is also to use scholarship, research, and outreach to make lives better for the communities in the US. The unifying goal of this project is to encourage a greater number of underrepresented undergraduates and K-12 students, especially high-need and female students, to pursue careers in the biotechnology or STEM disciplines. This will be accomplished through providing extensive educational resources and activities to underrepresented minorities, including: 1) Research training, field trip, and internship experiences, 2) Science mentoring at public schools by participating undergraduate students to keep them excited about their science and engineering and to help attract K-12 students to careers in the science and biotechnology, 3) Annual colloquiums (Research Day), during which students will present their research and compete for best presentation awards, 4) Student presentations at local, national, and international scientific conferences, 5) Week-long K-12 educator workshops in biotechnology and STEM disciplines, and 6) Improvement of research and teaching laboratories.

The **outcome** of **objective** includes: 1) Fifty-seven (45-academic year; 12-summer) underserved students will be directly supported in 3 years, 2) Forty-five K-12 science teachers will benefit from the week-long workshops in 3 years and will be the direct conduits to K-12 students, 3) Hundreds (100s) of FVSU students will be impacted through the research program, colloquia, and improvement of teaching and research labs. The funds requested under this proposal will be used primarily (60 percent) for stipend support of minorities involved in research programs, for travel support associated with the two-day field trips and with presentations of their research at local, national, and international conferences. The proposed will address the Competitive Preference Priority 1: Promoting innovation and efficiency, streamlining education with an increased focus on outcomes; Competitive Preference Priority 2: Fostering knowledge and promoting the developmental skill to prepare students. Since the expected results will provide support to prepare STEM students for the 21st century workforce by conducting formalized research and professional development programs. The research experience will allow junior, senior, and master's level students to perform research activities in state-of-the art facilities. The professional development program will provide students with mentoring, research experiences, and career ready skills.

LA - Dillard University
New Orleans, LA
Institutional Grant
P120A200014

Abstract

Phase II of Deeper Student Learning (DSL) Pathway to Success in STEM will foster an approach that promotes inquiry-based learning or a higher-order cognitive skill such as the ability to analyze, synthesize, solve problems, and thinks meta-cognitively in order to construct long-term understanding. Inquiry based learning involves the critical analysis of new ideas, linking them to already known concepts, and principles so that this understanding can be used for problem solving in new, unfamiliar contexts.

The students targeted for this Phase II project will be second- and third-year DSL cohorts, building from our successful Phase I application to engage new students to Dillard in pre- Freshman-based science training. The goal is to engage these students (most of whom are African American women) in Deeper Learning or an intensive exploration of scientific subject matter using inquiry-based student-centered knowledge and skills in a way that prepares them for real life. Our proposed Phase II Deeper Learning program also entails a sustained, substantial, and positive influence on the way students act, think, or feel. This project will provide advising, supplemental instruction, recitations, course modules and supportive activities and other programs with mentors, etc. which will have a lasting institutional impact on Dillard University.

This project is designed to address Competitive Preference Priority 1--promoting innovation and efficiency, streamlining education with an increased focus on improving student outcomes, and providing increased value to students and taxpayers. Also, this project address Competitive Preference Priority 2--Supporting instruction in personal financial literacy, knowledge of markets and economics, and knowledge of higher education financing and repayment (e.g., college savings and student loans) or other skills aimed at building personal financial understanding and responsibility.

MD - Bowie State University
Bowie, MD
Institutional Grants
P120A200059

Abstract

Science, Technology, Engineering, and Mathematics (STEM) higher education continues to face the major challenges of low student enrollment and high attrition rates. Many STEM students, especially the female students, end-up switching their majors to non-STEM fields, perform poorly relative to their peers in other majors, and/or drop out of college without earning an academic certificate or degree. The Department seeks to significantly increase the number of students who enroll in computer science and virtually eradicate the high attrition rate from the major. The goals are to retain and graduate almost every, if not every, student who chooses Computer Science as a major. The Department anticipates an increase in retention by five percent each year of the proposed effort. Research and application activities will be used to engage the interest of all of the students especially our female students. They include: Storyboarding and Game Design, App and Web Development, Cloud Computing and Security, Cybersecurity Basics, Augmented Reality Using Drones, Security and Embedded Systems, Computer Games and 508 Compliance, Data Science Concepts and the Weather, Discrete Structures and Functions, Calculus Fundamentals for Computer Scientists, History of Women in Mathematics, Computer Science and Women of Color. This Bowie State University proposal is supporting Competitive Preference Priority 1.

MD - University of Maryland Eastern Shore
Princess Anne, MD
Institutional Grant
P120A200008

Abstract

The University of Maryland Eastern Shore (UMES) is a historically black 1890 Land Grant Institution in the State of Maryland. The proposed project will implement and assess the efficacy of Catalytic Learning Model (CLM) based on Student-Centered Active Learning Environment with Upside-down Pedagogies (SCALE-UP) paradigm at the UMES. The SCALE- UP will be designed to fit the cultural environment to improve retention, persistence, and graduation of women and underrepresented, underprepared minority students in Science, Technology, Engineering and Mathematics (STEM) at UMES. This model is a proven pedagogical practice that ensures student learning, persistence, and timely graduation. This teaching setting is filled with adaptive learning technology, educational simulations, personalized learning, active- or project-based learning, faculty-centered strategies that systematically improve the quality of teaching, or multi-disciplinary efforts focused on improving instructional experiences.

The objectives of the proposed project are as follows:
(1) To implement innovative CLM in a technology-rich, highly collaborative, hands-on, interactive learning environment, (2) To build a community of STEM educators to replicate CLM Classroom in the future in other STEM courses, (3) To reduce students' failure rates and improve passing grades, and (4) To improve students' problem-solving ability, and conceptual understanding, attitude towards STEM courses, and class attendance.

After successful implementation of CLM, we expect to have, at least, the following outcomes: (1) students' conceptual understanding will increase, (2) students' problem-solving ability will improve, (3) failure rates, especially for women and minorities, will drastically reduce, (4) students' attitudes toward STEM fields will improve. We strongly believe that by adapting CLM, we also could achieve the aforementioned outcomes; especially the high failing rates of STEM courses could be lowered significantly.

NC - Johnson C. Smith University
Charlotte, NC
Special Project
P120A200077

Abstract

Financial Technology (FinTech) is one of the most rapidly growing industries in the United States. Currently, there is a significant shortage of skilled workers for FinTech occupations. According to the U.S. Bureau of Labor Statistics, there is a projected demand of 626,000 new workers for related jobs through 2026. Underrepresented ethnic minorities university students can help bridge this gap, but it is imperative to stimulate student interest in FinTech while connecting them to relevant coursework and experiential learning opportunities. Johnson C. Smith University (JCSU), which is located in Charlotte, North Carolina, one of the country's largest FinTech hubs, is well suited to help spearhead this effort.

JCSU's Minority Science & Engineering Improvement Program (MSEIP) First-Year Undecided Students Project will identify a total of 90 first-year, minority students who have not declared a major, and provide them with access to key tools and training in computer science, data analytics, and financial planning. Through the proposed activities, students will receive a Bloomberg Certification, Financial Planning Certificate, and a minor in Financial & Technology Planning. Ultimately, JCSU will equip each student with the skills and knowledge needed to secure FinTech jobs immediately upon graduation.

The MSEIP First-Year Undecided Students Project addresses Competitive Preference Priorities 1 and 2.

NC - North Carolina Agricultural and Technical State University
Greensboro, NC
Institutional Grant
P120A200056

Abstract

This proposal is to develop strategies and enhancement activities to attract minority and female high school students into the STEM education; and improve the quality of engineering training of minority undergraduate students for a career in STEM fields through the state of the arts research areas in Additive Manufacturing and Robotics. The proposal addresses MSEIP goals to improve the quality of training in science and engineering at minority institutions, and also plans to consider the competitive preference priority 2. The proposal aims at the development of educational enhancement programs to improve technical skills, personal financial literacy, financial responsibility, and the entrepreneurial mindset of minority students. Specifically, these goals will be achieved by tailoring project activities around the concept of "concerted cultivation" of talent. These results will provide important insights into how to effectively improve STEM education across the country, in general, and how to significantly enhance broader participation, increasing student success as well as how to develop career readiness competency skills for minority students in STEM fields.

OH - Central State University
Wilberforce, OH
Institutional Grant
P120A200067

Abstract

Central State University (CSU) is the only state supported Historically Black Colleges Universities (HBCU) in the state of Ohio located in a rural area. As a minority-serving institution, CSU welcomes students of varying preparation and skill levels. The ACT or placement scores of majorities of incoming students do not meet the threshold for placement in the standard College Algebra. Understandably, this causes a low success rate in College Algebra and negatively impacts retention among Science, Technology, Engineering, Agriculture and Mathematics (STEAM) students. To address this issue, **Improving Mathematics Instruction for STEAM Students (IMISS)** uses innovative strategies that have the potential to lead to significant and wide-reaching improvements in the delivery of educational services and tangible educational benefits to students, which directly addresses the Competitive Preference Priority One as described in the Program Solicitation.

The IMISS project includes three activities namely 1) co-requisite remediation for College Algebra and "just in time" tutoring for other mathematics courses; 2) peer mentoring through STEAM Ambassador program; and 3) professional development programs and engagement by providing opportunities to interact with STEAM professionals, both within and outside of the academic realm. The Goals for this project are 1) increase student success in College Algebra and thereby other mathematics courses; and 2) increase retention and graduation rates among STEAM students. Success in these areas would significantly contribute to the numbers of African Americans and women in STEAM careers. Average success rate in last three academic years for College Algebra with a grade C or above is 44.8 percent and 62.3 percent for Calculus I. In AY2018, 802 students were enrolled in College Algebra and Calculus I combined, 378 students were passed with a grade C or above. In that view, we expect to increase the number of successful students to 418 in the first year, to 482 in the second year and 562 in the third year.

PR - Universidad Ana G. Mendez, Gurabo Campus
Gurabo, PR
Institutional Grant
P120A190019

Abstract

Graduate students in STEM fields need to write to communicate research, achieve milestones in degree programs, improve credentials, and move ahead in careers. Without publishing, their advancements and achievements in research would be obscured. However, graduate students receive little, if any, training in technical scientific writing prior to or during their graduate programs. Fear of failure and procrastination lead to writing anxiety and thus, contribute to attrition amongst graduate students. The issue becomes greater when examining the perceptions of English-Language Learners (ELL) graduate students. Researchers support and encourage the integration of successful writing learning models in graduate student education and teaching graduate students how to write.

PROJECT OBJECTIVES: (1) Increase the number of graduate students completing their degrees in STEM at UAGM-GC by 10 percent. (2) Increase the number of graduate students disseminating their research at conferences, symposia, or research publications at UAGM-GC. (3) Increase the number of graduate students participating in professional development workshops, internships, or hands-on training research skill development opportunities. (4) Promote academic and research success by improving graduate students' scientific writing skills through course interventions, stand-alone workshops, and a summer writing boot camp (SWBC).

GRADS will provide much needed training, mentoring, and support for graduate students enrolled in STEM graduate programs at both the Doctoral/Master levels. **GRADS** will implement activities and course interventions that develop graduate students' writing skills, opportunities to disseminate research at National Conferences, and participate in professional development opportunities that will enhance their future STEM careers or increase the capacity to conduct their dissertation research. **GRADS** will improve and support scientific writing training of graduate students required as part of STEM graduate programs.

OUTCOMES: 24 graduate students through the SWBC; four graduate students through graduate assistantships; 90 graduate participants through stand-alone/course- embedded writing workshops; eight graduate students/eight faculty members through travel support to CFD-ITM, research conferences and professional development opportunities; 30 graduate students enrolled in Special Group Projects in Environmental Management courses (ENVM811/ENVM812); and 30 graduate students enrolled in Graduate Seminar courses (ENSC755/ENSC756). Ultimately, The **GRADS project will strengthen minority graduate student STEM education at UAGM-GC.**

PR - University of Puerto Rico in Aguadilla
Aguadilla, PR
Institutional Grant
P120A200097

Abstract

We propose to increase the retention rates and graduation rate of high need, Hispanic, STEM students in a three-year period. In order to accomplish the goal, two main objectives have been established: (1) to create a research peer mentored component which will promote and support the participation in year-round research and mentoring of high need students, from underrepresented minorities, in the fields of ecology, microbiology, virology, conservation biology, and biological oceanography; and (2) to increase the graduation rate, of high need students admitted to STEM fields by six percent, from 44 percent to 50 percent, while reducing the time to graduation from the current six years to five years.

We expect to reach the above-mentioned objectives through the following activities: first, An Undergraduate Mentored Research Approach" that can be divided into two components: (1) a peer mentoring component, "Success by Example: Peer Mentors in Research"; and (2) a freshmen development program, "Priming the Young Scientist: Road to Graduate School". In the peer mentoring component "Success by Example: Peer mentors in Research" incoming high need freshmen students will be assigned to an undergraduate research course, and under the guidance of a research mentor they will take part in a research project. Each research mentor will have five peer research peer mentors that will aid him in working with the high need students. The research mentors and peer research mentors will serve as role model and help the high need students make a successful transition to the university lifestyle. The Research mentor, together with his student mentors, will during the Summer develop a Citizen Science project in which they will apply the knowledge gained during their research project.

This program seeks to help university students develop and enhance a sense of identity, to become effectively integrated into the school, relate productively with the faculty, and feel a sense of belonging and have a sense of purpose about being at the university and pursuing their particular program of study. In addition, the mentor will help the student acquire the necessary skills to become an independent and life- long learner. In the freshmen development program, "Priming the Young Scientist: Road to Graduate School" students will be invited to participate in a Remedial Skill Summer Camp that has been designed to strengthen the basic skills in math that incoming students should bring to a university setting. It will include an introduction to university life that includes topics that will help students to adapt to the university lifestyle such as (1) time management, (2) establishing priorities, (3) study habits, (4) how to answer exam questions, and (5) Financial literacy.

Assessment will include process evaluation, to determine how effectively the plan of operation was followed and how effectively it responded to unforeseen events and feedback from formative evaluation. It will also collect and/or verify data on participation in program activities, for example, number of research projects presented. Most of the same assessment strategies will be used for both formative and summative evaluation. The principal difference will be in when the evaluation activities take place and how the results (data) are treated. Quantitative evaluation will assess the number of students who: participate and complete mentored undergraduate research projects; present and publish their work in regional and/or national symposiums and are retained and graduate in a timely manner (less than five years), all compared with previous years. This project will be continued by the institution once the federal funds are gone.

TX - The University of Texas Permian Basin
Odessa, TX
Institutional Grant
P120A200040

Abstract

The national need for science and engineering education is well documented which has spurred a strong push to promote STEM education all over the country. Permian Basin region in West Texas and Southeastern New Mexico are in dire need of a change in STEM education. The University of Texas Permian Basin (UTPB), an HSI and an MSI, is surrounded by one of the largest oilfields in the country and is home to over 6,500 students and 250 teaching faculty. Located in Odessa, Texas, the University sits at the epicenter of a region whose economic growth and technological advancements have global significance. UTPB has been supplying engineers to this region for the last eight years. However, the UTPB engineering program has low retention and six-year graduation rates.

The goals of the EM-STEP project are to increase recruitment, retention, and graduation rates with STEM undergraduate students. Simultaneous improvement in all three areas will greatly benefit minorities and female students. EM-STEP strives to achieve these goals via integrating six different desperately needed activities: Saturday Mathematics Academy, Peer Lead Group Learning, Professional Lecture Series, Freshman Seminars, Recruitment and Summer Projects. Complementary efforts on outreach recruitment will enhance the effectiveness of the proposed project.

Saturday Mathematics Academy will offer Saturday classes during the academic year to reinforce Calculus I, II, III, and Differential Equations that are bottleneck courses in all four engineering disciplines (Chemical, Electrical, Mechanical, and Petroleum Engineering). Four engineering faculty members from four different departments will teach problem solving skills and “how to learn” concepts in Saturday Mathematics Academy. This is critical as too many students are dropping out in their first two years of college. This is due to failing in the basic science courses before seeing engineering faculty. Peer Lead Group will offer help and support to freshmen and sophomore college students and will offer advice and motivational support. Summer Projects will provide 12-weeks of hands on experience focusing on practical problems and students will receive a stipend for their attendance.

Professional Lecture series will cover various soft skills and improve self-esteem and motivate students to stay on course. Freshman Seminars will introduce a wide variety of topics to increase academic performance, persistence and social integration. Recruitment activities will involve reaching out to students from high school and community colleges. This outreach approach will focus on increasing the number of minority and female students.

Expected outcomes will be 10 percent increases in recruitment, retention, and graduation rates especially for minorities and female students. Best teaching and learning practices can help students overcome various work and family pressures, engage, retain, and graduate minority, women, and struggling students. The program will provide a comprehensive and immense benefit to minority students, as there will be many opportunities for interacting with them. Additional outcomes of the proposed project are improving student self-esteem, confidence, and capacity to learn. Students will gain the competency to envision a clear and bright career path. Finally, the program will provide cultural diversity and sensitivity training to both faculty and students.

The proposed project addresses Competitive Preference Priorities 1 & 2 of MSEIP. Design and execution of project will be offered to other schools. Lessons learned, best practices and problems encountered will be disseminated via lectures in various events and venues, conferences, and journal papers.

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Abstract

The University of St. Thomas (UST) is an independent, Catholic coeducational university in Houston, Texas. UST proposes the MSEIP Next Gen Researchers Project, consisting of three activities: 1) the creation and delivery of two specialized math courses designed to increase student success in entry-level chemistry and engineering courses based on successful designs at MSIs; 2) the implementation of a special coaching and advising consultant to provide intense, wrap-around support to underrepresented students in STEM to increase their retention and graduation rates that includes mentoring and tutoring, and 3) the creation of a joint research program during the academic year and a special summer research experience for cohorts of UST students and students from the STEM Bridges program, a program that provides hands-on research, enrichment activities and mentoring.

The grant meets Competitive Priority Number One: *Promoting Innovation and Efficiency, Streamlining Education With an Increased Focus on Improving Student Outcomes, and Providing Increased Value to Students and Taxpayers.* The redesign of the specialized math courses will revolutionize the way math is taught at UST for chemistry, engineering and other STEM students, and we will witness significant increases in success rates. By preventing students from failing gatekeeper courses, we save our low-income students valuable tuition dollars, benefiting students and federal financial aid programs that provide tuition funds as well. The courses will allow students to understand and integrate math concepts throughout their STME courses, meaning the numbers of student retaking courses will decrease, leading to a significant success at the university-level. These are significant and tangible education benefits that help students, educators, and higher education institutions. Moreover, this proposed program is highly cost-effective. Over the course of the grant, 845 students will receive impactful services as a result of this grant, at a total cost of $296 per student per year.

During Year One, courses will be created and piloted for Math for Engineering and Math for Chemistry. Students must integrate the math lessons in order to apply them to various STEM studies. UST faculty report this is the greatest weakness for UST students, and the largest impediment to academic success in the STEM fields. These courses will be delivered each year thereafter, with an estimated 150 chemistry students and 100 engineering students completing the courses each year.

UST students will also participate in hands-on research with students from the STEM Bridges nonprofit program, a population that is 100 percent female, 86 percent first-generation, and 99 percent underrepresented youth. They will participate in a special summer research experience and those that wish to participate further will work on research projects during the academic year. Hands- on research projects will encourage collaborative learning. Studies show that collaborative learning allows more underrepresented students to participate in STEM, particularly engineering, and those student participants are more likely to be retained in engineering and other STEM programs than those that do not participate.

The program evaluation will be completed by a professional, independent evaluator with experience working with underrepresented students in STEM fields. Reports will be provided to the Department of Education, posted on the MSEIP program website, published in campus newsletters and disseminated as appropriate to leading MSIs to encourage program replication.