Title III 5- Year Proposal
Covering October 1, 2017 – September 30, 2022

Project Director: *Dr. Seyed Roosta*

1. Name of Institution: **Albany State University**	2. Activity Title: **Center for STEM Education** 3. **Activity Number**:
4. Focus Area: *Improving STEM students' passing, retention and graduation rates; Improving high school teacher preparation; Improving Administrative processes; building STEM faculty capacities in teaching*	**5. LAA Category:** - 2, Classroom renovation - 3, Faculty Development - 4, Academic instruction - 6, student service programs - 7, Administrative management - 10, Enhancing pubic school teacher education - 11, Community outreach for secondary students

Budget Request Amount: $ 433,494 (for year one)

6. Narrative
A. INTRODUCTION

Purpose: The overarching purpose of the activity is to study, implement and institutionalize a more successful way to educate Albany State University's STEM students. We propose to create a new, centralized, location for STEM education whereby ASU implements, measures, then institutionalizes successful efforts. We propose to design and implement a new Center for STEM Education with the overarching mission of improving passing, retention and graduation rates in the STEM disciplines. The Center will carry out several sub-activities, will have a full time Project Manager, will have a Dean-level Director and will have an external advisory board.

Population served: The Center for STEM Education will serve all students who have declared majors in Chemistry, Mathematics, Biology, Forensic Science, Computer Science and Engineering. These comprise the STEM disciplines for ASU. As of Fall 2016, Albany State University (including Darton College students) had a total of 735 STEM majors in these disciplines, or ~10% of the combined student population of 7,161. Looking only at BS-level students, ASU had 512 STEM students against a degree-seeking body of 2,594. That is, twenty percent (20%) of the students who come to ASU seek degrees in one of these disciplines. Although enrollment has changed over the years, the percentage of bachelor's degree-seeing students has remained about the same. The Center will focus on BS degree-seeking students, but will also reach anyone taking STEM courses in their first two years. The Center will offer a series of Saturday Academy workshops for high school students who are interested in STEM studies. Hence, the Center will reach high school students and teachers in the region and all STEM Bachelor's degree-seeking students at ASU.

Demonstration of Need: *(NOTE: This section taken from a 2017 Department of Education proposal.)* Albany State University – an Historically Black Institution located in Southwest Georgia, is a comprehensive, coeducational liberal arts college that offers undergraduate and graduate curricula, building on a strong liberal arts foundation. Albany State University proudly serves its historical role of improving the quality of African Americans, while focusing on the effective delivery of academic and research services to all students. As of January 01 2017, Albany State will merge with Darton State College, a two year institution, also located in Albany GA. Plans for consolidation have been approved by the Southern Association of Colleges and Schools. The two will combine to form one of the largest public HBCUs in the nation, with an undergraduate enrollment of just under 7,200.

Regional setting: *(NOTE: This section taken from a 2017 Department of Education proposal.)* The City of Albany is one of the poorest cities in the nation. The recent performance report by the Georgia Department of Education – Georgia College and Career Ready Performance Index (CCRP) which measures schools and school districts on a 100 point scale, gave a rating of 57.4 to the local Dougherty County high schools. A significant number of these students, and others from the institutions rural service area, attend Albany State University. The minimum requirement for acceptance is an SAT score of 830 (400 Math and 430 Verbal) or 17 on the ACT. These low score requirements and overall lack of high school preparation by many of our STEM students are challenges to promoting and sustaining STEM programs at the college level.

Performance in mathematics: *(NOTE: This section taken from a 2017 Department of Education proposal.)* Each Academic Year (not counting summer), Albany State offers 10-12 face-to-face sections of Pre-Calculus and two to three sections of Calculus I, each with the capacity for 35 students. Over the past three years, we average 387 students who complete Pre-Calculus and 125 who complete Calculus I. Given the class size and the sheer volume of students, the five full time faculty members in Mathematics are hard-pressed to offer individual assistance or innovative teaching.

Passing rates for the first two courses in the STEM mathematics sequence are quite low. Over the past three years, just under 65% of students who completed Pre-Calculus passed with an A, B or C. Please see table 1 below. This includes students who repeated the class. Similarly, just under 60% passed Calculus I. While these rates mirror national norms, here at ASU, this means an average of 186 students, almost all of whom are STEM majors, did not complete the math course they needed to. Their math progress stopped, and so too their science studies.

Table 1: Passing rates for Pre-Calculus and Calculus I

	Pass % 2013	Compl 2013	Pass % 2014	Compl 2014	Pass % 2015	Compl 2015	Three year ave pass %	Three year ave Compl
Pre-Calculus	61.6	405	63.3	439	71.5	317	**64.9**	**387**
Calculus 1	51.7	133	49.3	124	80.2	118	**59.2**	**125**

NOTE: Passing means a final course grade of A or B or C for the Academic Year indicated
NOTE: Completing means received a grade (I, W and W/F are not counted)
Source: Department statistics

Overall STEM performance: *(NOTE: This section taken from a 2017 Department of Education proposal.)* Poor first-level performance in mathematics sets the stage for failure in students' first science courses: Between 40 and 45% of students fail General Chemistry I the first time they take it. Around 40% fail their first Physics course, 45% their first Computer Science course and around 30% their first Biology course. Mathematics preparation is a contributing factor in their poor performance in these courses. If they stumble in their first level classes, then have to repeat, students are much less likely to persist as a STEM major. In the best case, they now find themselves on a five or six year track to graduation.

Retention rates: *(NOTE: This section taken from a 2017 Department of Education proposal.)* Retention within discipline from students' freshmen – sophomore years (30 hour retention rates) vary by major, as seen in table 2 below. Overall, the three year average is 55.7% retained at 30 hours of coursework attempted.

Table 2: STEM retention percentages within major by cohort year

Major	2011 cohort	2012 cohort	2013 cohort
Biology	60%	58%	60%
Chemistry	54	56	58
Comp Sci	47	50	32
Mathematics	56	86	N/A
Total	55.3%	58.2%	53.9%

Source: ARCOS reporting system

Graduation rates: *(NOTE: This section taken from a 2017 Department of Education proposal.)* Even with a six year graduation timeline, the data are not promising. As table 3 below shows, graduation rates in the STEM disciplines are below 50% for the last three cohorts.

Table 3: Albany State University STEM Graduation trends
*Source: Argos Reporting System

Discipline	New First Time Freshmen Cohort 2010			New First Time Freshmen Cohort 2009			New First Time Freshmen Cohort 2008		
	Total in Cohort	Graduate 6 years	%	Total in Cohort	Graduate 6 years	%	Total In Cohort	Graduate 6 years	%
Biology	74	23	31%	61	22	36%	73	36	49%
Chemistry	41	12	29%	25	9	36%	22	8	36%
Computer Science	27	9	33%	35	3	9%	27	5	19%
Mathematics	6	3	50%	14	6	43%	7	2	29%

* The Cohort in this table is defined as the First-time, Full-time Freshmen who declared a major at their entry to the University.

Indications: *(NOTE: This section taken from a 2017 Department of Education proposal.)* We simply must do a better job of preparing students who are interested in science and math. We must do a better job in high school. We must do a better job in the first year of college. We must

train our high school teachers to recognize student understanding and the lack thereof. We must train them to adapt to learning styles and different modes of delivery. They in turn, must return better-qualified students. In the interim, we must provide support for college students taking math courses…not haphazard, weekday-only student to student assistance, but professionals whose business it is to educate college students, whose training sets them apart from other practitioners, and whose future depends on our students' successes.

Prior STEM Education Efforts: Many STEM education projects have been conducted at ASU over the past 10 years. Most had elements or activities that were successful. Examples include the NIH MARC program, the NSF HBCU-UP Implementation Project, the NSF HBCU-UP Targeted Infusion Project, the NSF FGAMP program, the NIH RIMI program and the NSF HBCU-UP PCFF project. In each project, STEM education efforts were proposed, funded and executed for project needs, and so, generated project-level results. All of these projects had some level of success in their goals and objectives. In fact, many did very well. Most Federally-sponsored programs to improve STEM education are housed in one department, and/or are directed by one person. They conduct their activities as planned, they write their reports, and they wrap up the project. The project went well. Everyone is happy. Very little changed.

No projects have been funded to change the way ASU educates STEM students on a wholesale level. None addressed all STEM students. None addressed all STEM faculty. None involved every STEM department. And so, none of these projects have led to systemic change in the way we educate STEM students. None have led to a Program of STEM Education for our students. We propose to do exactly that. We propose to implement, study and institutionalize a comprehensive program for student STEM success.

Expected Outcomes: Overall, we aim to increase the passing rates in first and second level STEM courses, to improve retention rates in the STEM disciplines and to increase the graduation rates among STEM majors.

Perhaps more important for the STEM education community at the national level, we expect to engineer a systematic method of assessment for STEM education programs. We expect to collect a large amount of data about the activities we conduct. In addition, we expect to use data from other units at ASU who conduct support programs for students, such as supplemental instruction by faculty members, peer tutoring and faculty office hours' visits. Combined, we expect we will have a much more in-depth knowledge of STEM success that simple test scores and grades would yield.

In turn, this in-depth information can be used as a basis for institutionalization of the more successful efforts. We expect that within five years, many of this projects' activities will have be institutionalized as the normal course of business for ASU.

B. ALIGNMENT TO INSTITUTIONAL STRATEGIC PLAN

Strategic Goal Two: Aspire to Excellence - in teaching and learning, thus becoming the first-choice institution for students from southwest Georgia and garnering recognition as a premier southern regional university.

The majority of the Center's efforts support this Goal. In the end, the point of the Center is to find and promote excellence in STEM teaching, to re-tool the methods of instruction and faculty motivations for teaching success.

One of the tenants of the Strategic Goal is to encourage developmentally focused teaching-coaching. We propose a College-wide faculty mentoring program to do just this. To date there is no such program at ASU. Building on the success of the HBCU-UP Implementation Project, where faculty mentoring was an important deliverable, we intend to ask each faculty member to mentor between 15 and 20 students, meeting in small groups every two weeks. This will provide very nearly one-on-one coaching services to our students.

What we propose a Center here which will succeed: 1) We already have broad faculty support for improving STEM education outcomes because of the various projects which have gone before. 2) Funding for a five year period is sought through Title III. Although the end goal is to institutionalize successful efforts, a sustained period of funding will be needed to ensure success. 3) By year two or three, we anticipate many of the activities in this Center will be funded externally, thereby increasing the scope and effect of the project 4) At the end of year five, we anticipate the Center will be removed from Title III support by moving successful project elements to state auspices or by other external support.

To support the Goal, we will create a process for certifying and/or credentialing STEM instructors. We will offer and develop a teacher certification program, in concert with the College of Education. The program will improve teaching skills, but also offer additional credibility and proven excellence to our teaching ranks.

Also, we propose to conduct a series of workshops for STEM high school teachers in the service area. Building on a grant from the Board of Regents to the Department of Mathematics and Computer Science, we will invite high school teachers to campus several times a year for how-to seminars, idea sharing and social interactions. The serves to build the reputation of the Institution, and the broader teaching workforce. This has the added benefit of attracting more STEM students to ASU from the region via greater familiarity with their teachers.

Finally, technology will play a role in our Center's teaching efforts. Most of the instructional technology at ASU is a decade out of date. Fortunately, many of the newer technologies do not rely on large, expensive and fixed projectors, smartboards and the like. Most rely on collaborative online tools students can access via smartphones or tablets. Many of these new/collaborative online work spaces are used very sparingly at ASU, but are very effective in teaching our students. Continuing on the work of the HBCU-UP Implementation Project, we will make a study of best practices in classroom technology use and implement a plan of action at ASU to test out new media and new technologies for teaching.

Strategic Goal Four: Expand Access to Higher Education - As an access institution, Albany State University will promote student success for all by welcoming students from varying levels of academic preparation, keeping costs low, offering flexible class times and instructional modalities, and pairing high student expectations with exceptional mentoring, advising, and tutoring.

The Center will offer support for this Goal in the online learning tenant. The Center proposes to explore the effectiveness of online STEM learning, as compared to in-class learning. Math and Computer Science departmental experience suggests that the STEM disciplines do not lend themselves to online learning, but the question has never been asked and answered. There is only anecdotal evidence. We propose to establish which course(s) can benefit from online learning components and which cannot. In turn, this will inform the university community about which courses to offer online and which not.

Similarly, most STEM courses do have an online component, even if the class meets in person. WebAssign, D2L and textbook assessments taken online are the norm. But nobody has established if these delivery methods work better than in person (only) delivery and assessment. The Center will investigate this question via its data analysis activity and make recommendations to the broader university community.

Strategic Goal Strategic Goal Five: Elevate Historically Underserved Populations - Albany State University will recognize and address the many challenges that face African Americans and other students of color, adult learners, first generation students, students from low socioeconomic backgrounds, and others from underserved populations, and form strong partnerships with K-12, government agencies, and community outreach organizations to increase access and success rates.

The majority of Albany State's students, both before and after the merger with Darton State College, are African Americans and female. This group is notoriously under-represented in the STEM disciplines, especially Chemistry and Computer Science. The Center for STEM Education would take steps to improve students' success rates, retention, graduation rate and average time to graduation. In so doing, the project will foster growth in this critical, and underserved, STEM population. In addition, our outreach activities for high school teachers in the region will impact grades 9-12. Here, the Center will hold workshops to improve teaching and assessment methods so that students form our largely rural areas are better prepared for college.

Strategic Goal Seven: Attract and Retain Talented Personnel - Recruit and sustain a highly talented and expert team of faculty, staff, and administrators who collaborate effectively and efficiently with each other to achieve the vision, mission and strategic goals of the university.

The Center will support process improvement and thus help to build morale and improve customer service. Too often, faculty members get bogged down in the day-to-day routine. They get weary, and find little room for thoughts of innovation, either in their profession or their intellectual pursuits. But these are life-giving. To promote good teaching, an Institution must be able to offer faculty members time and space to consider what works, to think about what they

would like to try and to assess what they have done. Innovation improves efficiency. Innovation requires time and thought. ASU gives our faculty members very little time or thought, yet expects innovation and efficiency. The proposed Center will offer release time, on a limited basis, to faculty members who are interested in improving their teaching and have a plan to do so. Each year, the Center will offer five STEM faculty members one course release for two semesters to give them the time to design, conduct and assess new teaching methods.

Through the course of the project, these faculty members will have improved their teaching processes, and will be more efficient in their teaching. That is, more students will pass their courses and fewer will fail. Similarly, they will raise the overall morale of STEM students and faculty members through their success. Finally, each will have the expectation of a peer-reviewed publication about their work. Through publications, these faculty members will raise the overall image of ASU via conference and publication and name recognition.

C. ALIGNMENT WITH TITLE III PURPOSE

Enrollment, retention and graduation: Results of prior Federal projects at ASU show several approaches, in combination, to be very effective at improving retention and passing rates. In turn, these should translate into increases in graduation rates. Unfortunately, none of the Federally-sponsored programs at ASU existed long enough to *prove* an increase in graduation rates directly attributable to any one program. The Center will provide some activities proven to be successful, but just as important, will provide College-level coordination between STEM programs regardless of funding source. This coordinated approach will be much more successful than the current 'one and done' approach to STEM education.

The best evidence we have to date for STEM success comes from the ASU 2014-18 HBCU-UP Implementation Project. Here, passing rates in gatekeeping courses and 30 hour retention rates within major are tracked. The program targeted the middle $1/3^{rd}$ of the incoming freshmen STEM class. So far, this project has shown a 20% increase in passing rates for General Chemistry I (from a five year ASU average of 55% to 75%), an increase of 10% in College Algebra (from a five year average of 66% to 76%) and Pre-Calculus (from a five year average of 66% to 77%). Among the first cohort of students entering in 2015, 72% were retained at 30 hours. This is a 15% increase over five year institutional averages.

The project takes a combined approach to student success. Before the STEM students' freshman year, a summer bridge program is offered to hone their critical thinking, mathematics and writing skills. The live-in summer program finds tremendous benefit in the learning community it creates. Students study together in their freshman year, take courses together, and spend social time together. These bonds will last their whole lives. Once students begin their studies at ASU, they meet with faculty mentors every two weeks at the least, and take courses from the faculty members they worked with in the summer. This is very effective. Students are more familiar with their professors than students who did not spend time with them in the summer, are willing to reach out for help when they need it, ask for references for summer internships and, generally, engage in the process of discovery to a much larger degree. It is the combined approach of a summer bridge, faculty mentoring, student learning cohorts and courses taught by project faculty members that are the key components of the Implementation Projects success.

The HBCU-UP Implementation Project will end before the first cohort of students graduate, but as of May 2017, a remarkable number are on track for graduation within four years. Among the 14 students remaining in the program, 11 (78%) are on track to graduate within four years. If they all do graduate in this time frame, this would represent an increase in graduation rates at ASU of nearly 60%. In addition, 4/4 (100%) of the ENGN students in the program are on track to, or already have, transferred to Georgia Tech or Kennesaw State.

Other Federal programs at ASU have achieved more limited success, largely due to the lack of coordination and complementary efforts. For instance, the NIH-MARC (Minority Access to Research Careers) program sought to train students in research methods, study habits and offered a ~$1000 per month stipend to participants. The principal goal of the project was to get ASU STEM students to graduate in four years and into graduate research programs where they would pursue PhD programs. Unfortunately it was not successful in enrolling even one student in

graduate school in the four years the program was funded. NIH will not re-fund the program. Although well engineered, the project suffered from a lack of coordinated support in the Departments it served, and, predictably, failed. Student mentoring was not a priority, faculty support was low, and research projects were limited.

The Center for STEM Education would, as one of its core objectives, coordinate Federal projects amongst Departments to optimize each program. Although the Center cannot offer scholarships to students or summer bridge programs due to the structure of the Title III funding vehicle, it can coordinate students and faculty amongst other programs that do. For instance, the NSF S-STEM program offers scholarships and a limited amount of faculty mentoring. The HBCU-UP Implementation Project offers mentoring and cohort learning. The FGAMP program offers conference presentation of research findings. The University is considering a summer bridge program for all entering freshmen as part of the normal course of business. Several new research projects have been funded in the past year. As part of their projects, they will provide opportunities for STEM students to conduct research as a part time job, building their skill sets, CVs and relationships with other researchers. The Title III-funded Center for Undergraduate Research is unique to HBCUs, and is well received by students. The Center provides research experiences on a semester basis to undergraduate students in all disciplines, STEM included. The AARC provides peer tutoring services and scheduling. If these variously-funded programs were coordinated at the College level, and students tracked centrally, a much better result could be obtained, and quantified.

Better STEM success for the University will translate into better recruitment strategies, more outreach in the region and, in turn, an increase in Enrollment. Albany State already has several outstanding STEM programs. The BS degree in Chemistry is certified by the American Chemical Society. We are one of only a handful of programs with this internationally-recognized certifications. The BS degree in Forensic Science is accredited by FEPAC (a unit of the American Association of Forensic Science). We are the only HBCU in the nation to be so-accredited, and the only university in the state. Albany State graduates around 15 students each year in Computer Science. This exceeds the graduation cohorts in many HBCUs twice our size. But much more can be done to increase enrolment. The Center would provide outreach programs for high school teachers to come to campus several times each year for teaching strategy training, data collection and social events. This activity would increase teachers' familiarity with the campus, its faculty members and, in turn, with our programs of study.

In addition, the Center will offer a series of Saturday Academy workshops for STEM-interested high school students. Here the center would engage students directly, putting them in the excellent labs, research spaces and facilities ASU has to offer. Five faculty members would work with groups of 10 high school students for a full day eight times a year. Students would be paid a modest stipend for attending the whole day. Students would spend some time learning classroom techniques such as time management, test taking and study skills, then would spend the afternoon in labs or other research areas gaining hands-on experience. By reaching 80 students per year from the service region, ASU would have the opportunity to recruit students directly, and on campus. We expect this would yield an increase in STEM enrollment as a direct result of this activity.

Improving Academic Quality: The program will offer several activities to improve the quality of instruction students receive in high school and college. First, the Center will provide a means for certification in teaching STEM courses. Most faculty members come from research-intensive PhD programs were the focus is not on teaching. They may have been employed as Teaching Assistants, and indeed may have taken a seminar in teaching, but very few will come to their first year on the job knowing how to teach students. Almost none will come to the job knowing how to teach HBCU students. The Center will offer a centralized, coordinated certification program for STEM teaching. The certification program will be offered largely online through commercial vendors, and will take around 30 hours to complete. An additional unit about teaching to HBCU students will be developed in house, working closely with the College of Education. This unit will take approximately 15 hours to complete. Successful completion of all modules and assessments will yield a certification by the Center. Certified faculty members will be in a much better position to teach our undergraduate students and will improve the academic quality of instruction.

The Center will also offer a limited number of teaching scholarships (around 5 per year) to faculty members who are interested in improving their teaching by implementing a new teaching strategy. Examples may include increasing the use of technology or social media for teaching, using research in the classroom, using a small group to teaching instead of a lecture-based approach, exploring the effects of High Impact Practices on our students, etc. Faculty members would apply to the Center with a plan of study, an assessment methodology and a timeline for testing. Each would implement their new teaching strategy in at least one course in a controlled manner, yielding data about the effectiveness of their teaching approach compared to traditional methods. These would improve the quality of instruction the students receive, thereby improving their overall education offered by ASU. Through the course of the proposed Center, 25 STEM faculty members would receive scholarships, roughly half of the current STEM teaching cadre.

To improve teaching in high schools, the Center would offer a series of workshops for high school STEM teachers in the region. Each workshop would involve 10 teachers, and each would last for one day. Teachers would be tested on their content knowledge gains after each workshop. To quantify the effectiveness of each teachers' skills, the Center will use the Georgia TKES (Teacher Keys Effectiveness System) to assess teaching style, methods of delivery, ability to convey ideas, clarity of expectation, etc. The TKES assessments will be performed by the Center Co-Director. Topics to be covered in the workshops may include EOCT course testing, flipped classroom use and practice, planning lessons to increase student engagement, keeping and maintaining student statistics, real-world problems from a research perspective and increasing rigor in the classroom. Through a grant from the USG Board of Regents, a pilot program for high school teachers is already underway. Initial indications are that teachers are ready and willing to attend, are interested, and very much want to improve their teaching abilities. Three such workshops have already taken place with targets of 10 teachers each. The target has been exceeded each time. The Center would complement this activity by providing human subjects research support, TKES teaching effectiveness assessments and data collection/storage and reporting.

Improving Student Services and Outcomes: The Center will provide comprehensive, systematic faculty mentoring in the STEM disciplines. Student mentoring will improve the level of service

the students receive at ASU, as they currently do not receive any such services now, unless they are part of one of the Federal STEM education programs. Students mentoring will improve student outcomes because 1) Problems are detected earlier and 2) A more personal approach to education will be taken. This activity is a crucial component in many Implementation projects around the nation, including the HBCU-UP project here at ASU.

Every STEM student will be assigned a faculty mentor from the summer before their freshman year. Students will meet with their advisors in groups of 5 for the first time following freshman orientation. From then on, students will meet with their advisors for one hour every two weeks for the duration of their studies at ASU. The purpose of mentoring is to keep up with students on a more personal level, and outside of classroom settings. Faculty members would get to know students' habits, weaknesses, strengths and abilities. They would be able to suggest external assistance if needed, career advice and internship contacts. The key is a more personal understanding of students' needs. Faculty members would be trained in expectations, data needed, mentoring guidelines, given contact information for campus services, etc. Since there are over 700 STEM majors, this is a large undertaking that will centralized coordination. If each faculty member spends 2 hours per week on student mentoring, and students meet with faculty members in groups of 5, then each faculty member can meet with 10 students per week, or 20 students in total. Thus, a total of 35 faculty members will need to be involved in student mentoring.

The Center will renovate and coordinate two collaborative teaching and learning spaces. These spaces will take the place of existing lecture-forward classrooms, but will provide students with additional capacity. The rooms may be used for the normal delivery method, but also enable small group work. Many of the younger faculty members have been asking for small group spaces for their teaching. The collaborative spaces increase the learning services available to students and, it is hoped, increase their course performance.

Improving Institutional Management: The Center's information collection and analysis functions would improve institutional management by detecting patterns in student needs, allowing responses to be formulated in a data-driven fashion. In the same way, the Center would be in a position to assess the effectiveness of specific student interventions. This, in turn, can be used for funding applications, research question formulation and, finally, institutionalization rationales.

The Center will collect, analyze and report on a great deal of student data. Some of this data is available through Institutional Research, e.g., grades, retention, course offerings and degree paths. But, more granular information is needed to reach a higher level of student success. Data on individual tests, study habits, time management, peer tutoring visits, conceptual problems students may have and career/grad school interest (which change) must be maintained and analyzed to improve student performance in a meaningful, and lasting, way. These data will be collected in a centralized fashion, and analyzed against a group-approved series of indicators. This has never been done before at ASU. Some programs in some departments have this kind of capacity, but most do not. The Center will thus improve on existing management decision-making processes.

Legislative Allowable Activities (LAA's): The activities proposed below all fall under the list of LAAs, as indicated below where each activity is discussed. The LAAs included are:
- 2, Classroom renovation
- 3, Faculty Development
- 4, Academic instruction
- 6, student service programs
- 7, Administrative management
- 10, Enhancing pubic school teacher education
- 11, Community outreach for secondary students

D. OVERVIEW OF OBJECTIVES AND IMPLEMENTATION STRATEGY

Objectives for the Center for STEM Education:
- Improve the 30 and 60 hour retention rates of STEM majors in BS degree programs (Math, Comp Sci, CHEM, BIOL and FOSC)
- Increase the four year graduation rate of STEM majors in BS degree programs
- Improve the teaching skills of full time STEM faculty in all programs
- Provide data collection and management services to University and sponsored initiatives in STEM teaching, learning and scholarship
- Improve high school STEM teaching skills in the service region

We propose the following activities:

Faculty teaching certification – Working with the College of Education, find and/or develop a suitable program of study for STEM faculty members who wish to improve their teaching and certification credentials. For completion of a specified series of modules, along with a module developed for instructors of HBCU students, the faculty member would receive a certification from the Center. The Center would cover the costs of the course, and so offer the course at no cost to the faculty members. Then, pay faculty members who complete the course successfully a small stipend each year as a salary supplement. A key component will be developing a teaching module for faculty at HBCUs, since no program exists for this. An example of a commercial product that might fit is the Magna "Principles of Effective College Teaching" course. Allowable under LAA 3, Faculty Development

Centralized data collection and management for STEM programs – Work with existing PIs and University partners to collect, analyze and manage data on the success or failure of STEM initiatives, especially support services and innovative teaching programs. Work closely with evaluation specialists and statisticians to improve project design and to analyze existing datasets. The data recovered and analyzed would be available to any and all, in the aggregate, for publications, grant proposals or reporting purposes. Allowable under LAA 7, Administrative management

Student mentoring – Each STEM student would be assigned a faculty mentor who would meet with them every two weeks at a minimum. This would continue along the lines of the HBCU-UP, FGAMP and S-STEM programs, but here, would be supported financially in small increments (rather than release time), then revisited each semester. The Center would provide lists of small groups and assign faculty members to each group. Faculty members would report biweekly to the Center. Allowable under LAA 6, student service programs

High school teacher faculty development – Several times a year, ASU STEM and STEM education faculty would conduct Saturday workshops for regional high school teachers. The workshops would involve pedagogical approaches, data analysis, electronic teaching, teaching literature and research-as-teaching approaches to student learning. ASU faculty would be paid a small amount for each workshop taught; teachers the same. Explore continuing education credits for teachers. This builds on previous work through Math and Comp Sci's Board of Regents grant program. This is a partnership activity. Here, ASU will partner with the school systems in the

counties that abut Dougherty (Lee, Terrell, Mitchell, Colquitt, Worth and Calhoun). MOUs will be signed with each school system to allow teaching assessments on school grounds and to allow use of new teaching strategies in the classroom. Allowable under LAA 10, Enhancing pubic school teacher education

High school student Saturday Academies – Several times a year, ASU STEM and STEM education faculty would conduct Saturday workshops for regional high school students. These Saturday sessions would have a classroom component and a research component. During class time, students would learn from ASU faculty members about study techniques, time management and the differences between high school and college life. During the research time, students will work with STEM faculty on their projects or topic areas. Hands-on work with ASU faculty is the key component. Students will be paid a small stipend for attending. While this component will not need an MOU, teachers from regional high schools will facilitate student applications and selection. Allowable under LAA 11, Community outreach for secondary students.

Collaborative teaching and learning space – Two spaces in BCB will be identified and be made available on a signup basis (but not otherwise) through the Center. These will be well equipped electronically, but mainly, they would be flexible in the way they arrange seating and working spaces. One such space exists in BCB, dedicated to Science Education. The Center would take over that space, with an additional space identified and converted. This responds to requests from junior faculty members looking for more collaborative spaces for students to work in small groups in class, rather than face-forward teaching. Allowable under LAA 2, Classroom renovation

Combined office hours – Building on the M&CS model, office hours for all STEM faculty will be agreed in departments to be shared. That is, faculty would not offer any additional office hours, but would agree to see students from other faculty members. The Center would have no involvement in assigning office hours, but would ask faculty members to track students' visits each semester. This activity comes at no cost to the project.

At-Risk student interventions – Continuing on an initiative through the Department of Education ASU Master's Enhancement Grant, the center will provide a full time Academic Success Coach for the 700+ majors in the College. The Coach would work closely with department Chairs to determine which students are not performing to minimum standards, then formulate a plan of study for each student. The study plan may include supplemental instruction, tutoring, study skills workshops, remedial courses, etc. as needed, and as provided by other units at the University. The Individual is emphasized. The most important objective of this activity is increasing the 30 and 60 hour STEM retention rates. Allowable under LAA 6, student service programs

Teaching innovation support – Each year, five STEM faculty members would be selected from an open competition to receive an award of $6,000 for the year. That amount is sufficient to buy one course release in each of two semesters, or one course release and travel to a conference, etc. The STEM teaching scholars will be expected to propose a course of action for improving their STEM teaching, be able to demonstrate improvement and demonstrate publication of materials. Allowable under LAA 4, Academic instruction

Steering Committee – A Committee comprised of all active PIs on STEM education projects and 6-8 community partners will be formed and meet twice per year. The Committee will hear reports on progress and issue an annual report to the Center's leadership team regarding direction and future actions. Community partners will be engaged in or work for a STEM-active organization in order to give ASU the best information available about STEM needs in the region. This is a partnership activity. Allowable under LAA 7, Administrative management

Administrative rewards – At the college level, faculty rewards for superior teaching need to be examined. The Center will provide information to senior management about effective approaches at ASU, and will offer feedback and suggestions on evolving promotion, tenure and annual review matrices. Ultimately, this is an essential component of Institutionalization. If ASU changes the way, and reason for, faculty rewards, monetary rewards will be less important. For example, a large budget item for the Center is Faculty Mentoring activities. This requires a large capital outlay spread over a large number of people, each of whom receives a small amount. If the P&T schedule gave points for faculty mentoring, more faculty members would self-select for this activity, doing it for the 'points' and not for the money. Allowable under LAA 4, Academic instruction

E. KEY PERSONNEL

Key personnel include the Center Director and Program Manager. Dr. Seyed Roosta will serve as the Center Director. Mr. Scott Pierce will serve as the Program Manager for the Center. Additional personnel include College of Education Collaborator(s) and a part time Academic Success Coach

Dr. Seyed Roosta currently serves as a Professor Computer Science and Chair of the Department of Mathematics and Computer Science in the College of Science and Technology at Albany State University, a post he has held since 2008. He also serves as the Lead Co-PI on the NSF HBCU-UP *"Implementation Project: From Learning Community to Teaching Community - A Grass Roots Approach to STEM Undergraduate Teaching and Learning,"* (Award number HRD 1436060), which seeks to improve undergraduate STEM teaching, passing, retention and graduation rates. Recently, Dr. Roosta also served as the Co-PI on a NIH Minority Access to Careers (MARC) program, which sought to increase the number of minority STEM students attending graduate school in the sciences. Dr. Roosta will provide leadership and direction to the Center, based on his considerable experience with Federal STEM education projects. He will also provide structures and data collection guidance for the Center and associated faculty members. Dr. Roosta will be a part time employee of the center (26% effort).

Mr. Scott Pierce will serve as the Program Manager for the Center for STEM Education. He currently serves Albany State University as Senior Program Manager for the $1.75 million NSF-funded HBCU-UP Implementation Project. Prior to his service to the NSF, Mr. Pierce served as the Program Manager for a 2009-2014, $4.3 million NIH-Research Infrastructure in Minority Institutions (RIMI) project. Mr. Pierce has over 20 year's project management experience, including six years full time federal award management of budgets in excess of $1 million per year. He also serves on the Institutional Review Board for human subjects research at ASU, and has served as Chair of the Research Committee. He will provide day-to-day supervision of project faculty and will work closely with the grant's external evaluators to draft reports, surveys, assessments and external review committee reports. In addition, he will track expenditures, initiate contracts and retain vendors as needed for the project. Finally, Mr. Pierce will be the main point of contact for data collection and dissemination for the Center. Mr. Pierce will be a full time employee for the Center (100% effort).

College of Education Collaborator: The College of Education will provide the Center with faculty for collaboration on pedagogical approaches and educational data collection, will assist the Director in educational programs for high school teachers and will provide frameworks for assessments of new teaching approaches for junior faculty members. The Collaborator(s) will be a part time employee(s) of the Center (17% effort).

Academic Success Coach: The center will employ a part time (50% effort) person to support "at-risk" students whose GPAs are below 2.0. The Coach will work primarily with freshman and sophomore students. S/he will meet with department Chairs to identify students who are failing at midterm their freshman year, then meet with each student to formulate a plan for success. Follow through will take the form of meetings with students and professors, and will continue until the student is safely above Institutional minima. The Coach will be employed in this capacity full time, but will be paid only 50% by the Center.

F. ASSESSMENT PLAN

The Center will provide both formative and summative assessments to Title III, as required, and in a manner specified. We will provide monthly progress reports and an annual evaluation, to be followed by a project level final report at the end of year five.

The Center will retain an external evaluation consultant to ensure data are collected appropriately and assessed in an unbiased manner. The consultant will be an expert in STEM education. The Evaluator will work closely with the Program Manager and Directors to make sure assessment instruments developed for the Center are engineered properly, that results are collated an analyzed without bias, and results reported accurately.

In addition, the Center will hold External Steering Committee meetings twice per year with all PIs of STEM education projects and community partners. These meetings will help to coordinate data collection and evaluation efforts and guage overall project scope and direction. Further, the PIs will be able to inform the Center on approaches, data and other project needs. The meeting minutes will be part of the assessment reports for the Center.

Formative assessments will consist of activity tracking (whether or not a funded activity actually took place as planned, along with how many participated), time and effort documentation, surveys to determine satisfaction, and interviews to be conducted by the evaluators. These data will provide feedback to the Center team, and to Title III, about which program elements are working as designed and which need improvement to stay on track. These data will be reported each year.

Summative assessments will consist of institutional data on course grades, retention, enrollment and graduation, in addition to TKES scores for high school teachers. These data are the main measures of overall project success. In the first year, only baseline summative data will be presented.

As an example, Objective 1 is described in formative and summative assessments in the table below. (This will be developed by the Center's external evaluators, for each Objective, based on the overall Performance Indicators below.)

Objective 1: Improve the 30 and 60 hour retention rates of STEM majors in BS degree programs (Math, Comp Sci, CHEM, BIOL and FOSC)			
Formative indicator	**Target**	**Summative indicator**	**Target**
Number of faculty members mentoring BS-seeking students	30	*Increase 30 hour (freshman to sophomore) retention rates in STEM disciplines*	Five year institutional average + 10%
Number of BS-seeking students participating in faculty mentoring meetings	500	*Increase 60 hour (freshman to junior) retention rates in STEM disciplines*	Five year institutional average + 10%

G. INSTITUTIONALIZATION PLAN

Faculty teaching certification: We anticipate this activity will have run its course in five years. That is, the Center will have reached all of the current STEM faculty members who desire certification. New faculty members' certifications (which we would estimate to be 2-3 per year) can be paid for from College of Science and Technology funds at an approximate commitment of around $1500 per year of College funds.

Centralized data collection and management for STEM programs: The Center activity will persist through the duration of the funding period, and in fact, will seek additional Federal funds through vehicles such as NSF's HBCU-UP Broadening Participation awards. Measuring and assessing within-course student performance and measuring pedagogical approaches will require ongoing external assistance, likely for an additional five years. By the end of year five, we expect the within-institution data collection (students stats from Institutional Research, post-graduation tracking, grades, etc) will be integral to the College of Science and Technology. There will be no further need for the Center to assist the College.

High school teacher faculty development: We anticipate this activity will be taken over by the University within five years. The amount of money needed for this activity is very small, only around $12,000 per year. This amount can easily be absorbed by the many outreach budgets the University has through the offices of Institutional Advancement, Academic Advisement, recruiting, etc. Unless this activity is made part of a broader study funded by external sources, no further support will be needed.

High School student Saturday Academies: As above with the high school teacher development program, we expect the University will take over this activity within five years.

Collaborative teaching and learning space: This activity will be concluded by the end of year one. No further support will be needed, unless other spaces are requested/need demonstrated by faculty members.

Combined office hours: Combining office hours do not cost anything, and can be institutionalized within year one, as directed by the Dean. Coordinating office hours, collecting data from faculty members about which students visit for how long and why will continue through the course of the five year Center project. Once concluded, Departments will continue this activity.

Teaching innovation support: These will not continue under the auspices of the Center after year five, but may continue under College or Academic Affairs budgets if they are deemed to improve teaching to a sufficient degree. By the end of year five, we anticipate the Center will have issued 25 such awards, reaching roughly half of the STEM teaching workforce at ASU.

Student Mentoring: College-level faculty rewards via Promotion and Tenure and annual evaluations will be the mainstay of institutionalization of the Center's faculty mentoring component. This is the largest and most expensive activity in the Center's portfolio. On a per-faculty basis however, the amount of money paid is relatively small. This could easily be

rewarded via points on evaluations, rather than dollars. The Center will work with Academic Affairs to change the requirements for tenure and annual evaluations to accommodate credit for student mentoring, thereby creating lasting changes to the reward structure. By the end of year five, this activity will be entirely off of Title III and other Federal support.

ACTIVITY OBJECTIVES AND ANTICIPATED RESULTS
Grant Period: 2017-2022

1. Name of Institution: **Albany State University**	2. Activity Title: **Center for STEM Education** **3. Activity Number: 1 (Title III, Part B)**
4. Activity Objective(s)	**5. Anticipated Results to Measure Success (Performance Indicators):**
Objective 1: Improve the 30 and 60 hour retention rates of STEM majors in BS degree programs (Math, Comp Sci, CHEM, BIOL and FOSC)	**Performance Indicator 1:** *Increase 30 hour (freshman to sophomore) retention rates in STEM disciplines by 10% over 5 year institutional averages by year two* *Increase 60 hour (freshman to junior) retention rates in STEM disciplines by 10% over 5 year institutional averages by year three*
Objective 2: Increase the four year graduation rate of STEM majors in BS degree programs	**Performance Indicator 2:** *Decrease the number of sophomore students with overall GPAs of <2.0 by 10% in each discipline by year five* *Increase the four year graduation rate in STEM disciplines by 15% over 5 year institutional averages by year five*
Objective 3: Improve the teaching skills of full time STEM faculty in all degree programs	**Performance Indicator 3:** *Improve passing rates in first year STEM gatekeeping courses by 10% over five year institutional averages by year two*
Objective 4: Provide data collection and management services to University and sponsored initiatives in STEM teaching, learning and scholarship.	**Performance Indicator 4:** *Conduct quarterly STEM grant PI coordination meetings* *Hold Steering Committee meetings twice per year* *Based on Center data and external information, evaluate project activities once per year, making programmatic changes as*

	needed
Objective 5: Improve high school STEM teaching skills in the service region	**Performance Indicator 5:** Conduct 8 workshops each year for high school STEM teachers in the region Achieve an overall satisfaction rating of 80% for each workshop, as measured by exit surveys Among teachers who participate, increase the average Student Growth Percentile (SGP) by 5% using the TKES Scoring System Among teachers who receive at least 64 hours of workshop training in any one year, increase the average Teacher Assessment on Performance Standards (TAPS) score by 0.5 on a 4 point scale using the TKES Scoring System
Objective 6: The Center faculty and staff will conduct proposed activities as planned and will issue reports to Title III as mandated by the Department of Education	**Performance Indicator 6:** Annual reports transmitted to the Title III office by stated, agreed deadlines Interim progress reports transmitted to the Title III office by stated, agreed deadlines Annual budget requests transmitted to the Title III office by stated, agreed deadlines

GRANT ACTIVITY FOR THE TITLE III PART B OR PART F PROGRAMS	
IMPLEMENTATION STRATEGY AND TIMETABLE FORM	

1. NAME OF ACTIVITY COORDINATOR AND OFFICE: _Enter here_	2. Activity Title: **Center for STEM Education**

3. SPECIFIC TASKS TO BE COMPLETED	4. PRIMARY PARTICIPANTS	5. METHODS INVOLVED	6. TANGIBLE RESULTS	7. TIMEFRAME FROM/TO
1: Faculty teaching certification	Center Director, Program Manager; STEM Chairs and faculty; CoEducation faculty	Plan and establish a course of study for certification of STEM teaching faculty, then train and certify faculty members	An increase in the university's course completion, retention and graduation rates	10/01/2017 – 9/30/2022
2: Centralized data collection and management for STEM programs	Center Director, Program Manager, Success Coach	Collect university, college, department and faculty-level data per student; Collect data on STEM support activities and effects; Collect data from STEM education grant projects to enhance coordination	Improve process decisions about STEM support, and ultimately, to increase retention and graduation rates	10/01/2017 – 9/30/2022
3: Student mentoring	Center Director, Program Manager, Success Coach, select STEM faculty, STEM students	Plan and conduct semi-weekly meetings with every STEM student at ASU to direct support services	An increase in the university's course completion, retention and graduation rates	10/01/2017 – 9/30/2022

			as needed, create study plans and detect problems with students		
4: High school teacher faculty development	Center Director, Program Manager, select STEM faculty, regional high school teachers	Plan and conduct workshops on STEM teaching methods and assessments	Improvement in TKES scores for high school teachers, indicating more effective teaching. Ultimately, to prepare high school students better for college-level work	10/01/2017 – 9/30/2022	
5: High school student Saturday Academies	Center Director, Program Manager, select STEM faculty, regional high school teachers; regional high school students	Plan and conduct Saturday STEM workshops for high school students in the region	Increase high school students' interests in studying STEM, and ultimately, to increase recruitment to ASU	10/01/2017 – 9/30/2022	
6: Collaborative teaching and learning space	Center Director, Program Manager, Facilities management, STEM faculty, STEM students	Plan, design and renovate two teaching spaces for collaborative and group instruction	Increase the use of instructional technologies and modes of teaching	10/1/2017 – 9/30/2018 (Year one only)	
7: Combined office hours	STEM faculty, Program Manager, College of Sci Tech Dean; STEM students	Plan for and adopt a combined office hour policy in the College of Science and	An increase in the university's course completion, retention and graduation rates	10/01/2017 – 9/30/2022	

		Technology		
8: At-Risk student interventions	Center Director, Program Manager, Success Coach, STEM Chairs, STEM students	Plan for and implement a series of corrective measures for students whose GPA is below 2.0, assess and record interventions	An increase in the university's course completion, retention and graduation rates	10/01/2017 – 9/30/2022
9: Teaching innovation support	Center Director, Program Manager, STEM faculty, STEM students	Provide course release or salary supplement support for teaching innovation and data collection on effects	An increase in the university's course completion, retention and graduation rates	10/01/2017 – 9/30/2022
10: Steering Committee	Center Director, Program Manager, Success Coach, STEM grant PIs, Community partners	Hold two meetings per year to discuss project performance and directions	Assess project effects; make corrections to design as needed	10/01/2017 – 9/30/2022
11: Administrative rewards	Center Director, Program Manager, STEM grant PIs, Academic Affairs Officers, Fiscal Affairs Officers	Study, design, them implement a series of evaluation and portfolio rewards for productive and innovative STEM teaching and student mentoring	An increase in the university's course completion, retention and graduation rates Ultimately, to institutionalize the Center's activities	10/01/2017 – 9/30/2022