USG STEM Initiative Annual Report 2013-2014

I. STEM Initiative Program Overview

A. Program Implementation and Operation – This section covers the operation of your institution's STEM Initiative Program:

1. Identify and explain the **key programs and projects** (i.e. mini-grant program, FOCUS-derived project, etc.) that comprise the STEM Initiative at your institution.

- Innovations in Teaching and Learning "mini-grant" program – the Georgia College (GC) faculty mini-grant program focuses on projects designed to improve: 1) student achievement in STEM courses, and 2) STEM education outcomes. The maximum award for a mini-grant is $7,000. Priority is given to improving student success in introductory courses and persistence to graduation in the major.

- Service Learning Course (FOCUS) – the 3-credit hour service learning course is an elective for most STEM and STEM Ed. majors and is required in the mathematics Teaching Connections track. Students work three hours each week on math and science with K-12 students and a partner teacher in the schools. Students develop Georgia Performance Standards and Core Curriculum GPS (GPS/CCGPS) inquiry lessons and hands-on activities with their partner teachers and keep a weekly reflective journal. The course includes a weekly one-hour seminar in which students share experiences and learn about GPS/CCGPS and inquiry-based teaching.

- B.S. degree program in Physics – this innovative degree program addresses a key statewide need for physics teachers and follows the National Science Education Standards' critical components to foster effective teaching and learning in the sciences, including active and collaborative working environments and strong, sustained relationships with students grounded in the diverse ways that they learn. The topics of mechanics, electricity and magnetism, thermodynamics, and quantum theory are expanded over two semesters to give students multiple exposures to key concepts and to emphasize the mathematics encountered throughout the curriculum.

- Growth of B.S. degree program in Mathematics – this degree program provides support in three critical areas for the university and the STEM Initiative: (1) introductory mathematics courses in Core areas A and D, (2) courses to support the B.S. degree program in mathematics, and in particular, the innovative "Teaching Connections" track for those students with a potential interest in a career in mathematics education, and (3) courses to support STEM education degrees at the B.S. and M.A.T. level with a mathematics concentration.

- STEM Retention Initiative – this program supports student success in introductory STEM courses with a proven strategy for increasing STEM retention rates. Supplemental instructors (SIs) are advanced undergraduate students who attend all lectures in a class, prepare for, and provide tutoring sessions (usually twice weekly) to students populating the class. The STEM Retention Initiative supports SIs in introductory courses across all STEM disciplines at GC.

- STEM Dashboard- this program provides an interactive database of student information for courses and majors targeted by the STEM initiative. When completed information will be

accessible through an interface that allows for standard reports as well as customized queries.

2. Identify **key personnel** associated with your institution's STEM Initiative program and briefly describe **each person's role**. Be certain to include all personnel whose salaries have been paid, either fully or partially, by STEM Initiative funds. Include any faculty or staff receiving course release time or some comparable form of compensation to participate.

Key personnel:

- Rosalie Richards – Co-coordinator, GC STEM Initiative. Provides leadership and coordination of overall STEM Initiative at GC. Oversees implementation of STEM Retention Initiative and budgetary components of STEM Retention and the mini-grant programs.
- Charles Martin – Co-coordinator, GC STEM Initiative. Provides leadership and coordination of overall STEM Initiative at GC. Oversees implementation of Service Learning Course and data collection for monitoring progress and impact of STEM-funded programs.
- Ryan Brown – Coordinator, GC STEM Mini-grant Program. Facilitates mini-grant call for proposals, organization of faculty review committee and award process, administration of mini-grant post-award support and expenditures, collection of final reports and data, and organization of annual mini-grant Symposium of awardee presentations in mini-conference format.
- Connie Rickenbaker – Faculty Coordinator, GC Service Learning (FOCUS) Course. Responsible for recruiting students into the program, teaching the seminar course, coordinating placements in K-12 classrooms, conducting in-class observations, collaborating to implement National Service Learning Clearinghouse Standards and best practices, and collecting and analyzing data on performance and impact of the program.
- Patti Veal – Administrative Assistant, GC Science Education Center. Assists with mini-grant program documentation, data collection, materials ordering and purchasing, periodic communication with awardees, and other administrative support functions, as assigned. Provides key organizational support for the annual mini-grant STEM Symposium event.
- Jeanne Haslam – Coordinator, GC Learning Center. Served as liaison for SIs in support of STEM Retention Initiative. Duties included the following: Prepare and conduct two Supplemental Instructor (SI) training sessions; help facilitate access to necessary SI resources, e.g. textbook, textbook website access, email distribution lists, etc.; communicate periodically with SI's, to send out announcements, timecard reminders, and other information and to collect attendance data and feedback comments.
- Arash Bodaghee– faculty member; assistant professor of physics, Department of Chemistry, Physics, and Astronomy. Key faculty support for B.S. degree program in Physics.
- Brandon Samples – faculty member; assistant professor of mathematics, Department of Mathematics. Key faculty support for Growth of B.S. degree program in Mathematics.

Other Personnel with STEM compensation:

- Victoria Deneroff – faculty mini-grant stipend
- Michael Gleason – faculty mini-grant stipend
- Yen Kang (Ellen) France – faculty mini-grant stipend
- Stephanie Jones – faculty mini-grant stipend
- Rui Kang – faculty mini-grant stipend
- Catrena Lisse – faculty mini-grant stipend
- Brian Mumma – faculty mini-grant stipend
- Samuel Mutiti – faculty mini-grant stipend
- Gita Phelps – faculty mini-grant stipend

- Wesley Smith – faculty mini-grant stipend
- Sandra Webb – faculty mini-grant stipend
- Caralyn Zehnder – faculty mini-grant stipend
- Rodica Cazacu – faculty mini-grant stipend

3. Identify **partnering departments, offices, or centers** participating in the STEM Initiative at your institution. Briefly discuss their relationship with the STEM Initiative and note any relevant contributions.
   - Science Education Center – both Director Rosalie Richards and Administrative Assistant Patti Veal are key personnel who help coordinate the GC STEM mini-grant program.
   - Center for Program Evaluation and Development – assist with program administration and development of STEM dashboard.

   STEM and STEM Education academic departments are key partners:
   - Department of Biological and Environmental Sciences
   - Department of Chemistry, Physics, and Astronomy
   - Department of Early Childhood and Middle Grades Education
   - Department of Foundations and Secondary Education
   - Department of Information Systems and Computer Science
   - Department of Mathematics

B. *Program Successes* – This section covers the key accomplishments of your institution's STEM Initiative program during FY2012:

1. Explain how your program has made progress toward Goal 1, **improving the readiness of P-12 students** for STEM in college. (You may wish to draw upon service learning programs, among other efforts. You also may wish to describe bridge programs or similar efforts directed at incoming freshmen.)

   The two components of the GC STEM Initiative that have made the most significant impact on the Goal 1 outcome of improved readiness for P-12 students in STEM are 1) the STEM Mini-grant program, specifically those mini-grants that have supported P-16 STEM Learning Communities, and 2) the STEM Service Learning (FOCUS) course.

   STEM Learning Communities (LCs) are groups of P-12 teachers and GC STEM and STEM-Education faculty who meet on a regular basis to share ideas and teaching strategies and discuss common challenges and ways to overcome them. Some key characteristics of such LCs are that they must involve both P-12 teachers and university faculty and that collaborative inquiry conducted in the LCs addresses the primary goal of improving teaching and learning (and hence student success) in mathematics and science in P-12 classes. STEM Learning Communities typically consist of 6-12 members, i.e. P-12 teachers and university faculty, organized around a specific discipline or a single grade level, and typically meet on a monthly or semi-monthly basis. At GC, LC proposals are solicited on an annual basis through a competitive mini-grant funding process (see section III-A below). Thus, through increased P-12 student engagement, learning, interest, and success in mathematics and sciences, STEM LCs lead to improved college readiness, particularly in the STEM disciplines.

   Impact Data: In the 2013-2014 year, three STEM Learning Communities were funded in the mini-grant process. The LCs ranged from the middle grades level up through the high school level for participating P-12 teachers and classrooms. A total of twelve P-12 teachers and twelve GC faculty

participated across the three LCs, more than twenty GC college students helped or collaborated in LCs, and more than 700 P-12 students were impacted by STEM LC projects.

STEM Service Learning (FOCUS) course is described in more detail in Section III-B below. However, it is worth noting here that a key benefit of the program is that participating GC students work three hours each directly with a P-12 partner teacher as a field component (i.e. on site) in the schools. The work is relevant to P-12 college readiness and preparation in that inquiry lessons and hands-on activities developed by participating students with their partner P-12 teachers are created with the Georgia Performance Standards and Core Curriculum GPS (GPS/CCGPS) in mind. See III-B for a more complete report on several indirect measures of student learning, as assessed by FOCUS students and partner P-12 teachers. However, two key pieces of impact data are provided here: first, in the context of content preparation and college readiness, teachers and FOCUS students reported the following of the students in P-12 classrooms impacted by the program:

- 100% agreed or strongly agreed that their students learned more math/science content.
- 100% agreed or strongly agreed that their students became more interested in math/science.
- 86.7% agreed or strongly agreed that their students were able to do more hands on activities.

In addition, 10 high school and middle grades students working with one learning community submitted projects to their regional science fair. Six of the students won first place awards.

2. Explain how your program has made progress toward Goal 2, **improving student success and completion rates**, by discussing how your program, a) **increased STEM majors**, b) **supported student retention and progression in STEM**, and c) **increased STEM degree completion**.

Some compelling data exist with regards to progress toward Goal 2 at GC. Since the STEM Initiative baseline year of FY07, great strides have been made in all three categories of student success comprising this goal.

First, regarding a) **increases in STEM majors:** the total number of STEM discipline majors rose from 725 in FY07 to 1313 in FY12, a remarkable increase of 81.1%. Next, considering b) **student retention and progression:** over all the introductory STEM courses tracked since the FY07 baseline year (see attached data spreadsheet), the A-B-C pass rate has increased from 73.5% to 83.6%, or an increase of over 10 percentage points since the inception of the Initiative. Also worth noting here is that one of the original STEM goals was to strive for 75% A-B-C across all introductory STEM courses. In FY07, six such courses at GC were significantly below the 75% target; in FY12 only two course remain on this list: MATH 1261 (Calculus I), and PHYS 2212 (Principles II), both with approximately 70-74% A-B-C pass rates. Computer Science courses were not listed among the original baseline courses in FY07. CSCI 1301 and 1302 (Computer Science I and II) have A-B-C pass rates of 73% and 69%, respectively. Finally, considering c) **increased STEM degrees:** 64 STEM discipline degrees were conferred in FY07; in FY14, that number had nearly tripled to 187 degrees (not including 15 M.S. degrees in biology), representing a 192% increase. Again, comparing to institutional data reveals the strength of this number.

Certainly, many positive factors have influenced these great strides of success in STEM student achievement at GC. See for example the discussion of GC STEM culture in item 4 just below. However, specific intervention strategies such as mini-grant projects funded to redesign introductory STEM courses, Supplemental Instructors (SIs) added as an additional resource for peer-guided learning in introductory STEM courses, and greater numbers of service learning, undergraduate research, and other engaged learning pedagogies have been supported by the GC STEM Initiative.

Thus, we are confident that the achievements gained are directly attributable in part to these STEM programs and activities.

3. Explain how your program has made progress toward Goal 3, **improving the pre-service P-12 STEM teacher preparation and production**.

   Inconsistent trends of growth exist for pre-service **STEM teacher preparation** at GC. In the STEM baseline year of FY07, there were 25 students majoring in the degree programs with concentrations in either mathematics or science at the middle grades and secondary level. By FY12, this number had more than doubled to 59 such majors (including B.S. Degree in Mathematics with a Teaching Concentration but not including M.Ed. or Ed.S. majors), an impressive increase of 136%. Next, over the same time period, the number of STEM Education degrees conferred decreased from 27 to 24 (including B.S. Degree in Mathematics with a Teaching Concentration but not including 11 M.Ed. or Ed.S. degrees conferred), or an 11% decrease, though the number of STEM Education degrees conferred has fluctuated, rising as high as 38 in FY12. Finally, it is worth noting that the combined STEM and STEM Education majors represented 12.4% of the student body in FY07, a figure not uncommon across higher education. By FY14, these majors had grown to account for 20.2% of the GC student body, representing an increase of 62.9% growth in STEM "market share" of the university.

   In addition to STEM mini-grants focusing on redesigned courses for STEM Education majors, several programs have favorably impacted the retention and success rates of GC pre-service P-12 teachers. One example is the service learning (FOCUS) course described in III-B below, and another is the STEM-funded mini-grants that focused on P-12 Learning Communities. Finally, the "Teaching Connections" track within the B.S. in degree in mathematics continues to provide a growing number of students with field experiences and pedagogical content knowledge necessary for smooth and successful transitions into the MAT degree programs with STEM concentrations.

4. Discuss **other key successes** of your institution's STEM Initiative program.

   Three other key successes of the GC STEM Initiative are worth noting here. First, dissemination efforts of the projects, successes, and impact on students at both the P-12 and college levels have produces a significantly higher level of success than was anticipated. Please see section IV-A below for a more detailed description of the some of the presentations and activities resulting from dissemination of STEM Initiative work, as well as an extensive list of examples, with presenting partners coming from GC faculty, GC students, GC staff, and P-12 partner teachers.

   The STEM Dashboard project, in its third year, continues to move forward. The basic plan behind the STEM Dashboard project is to collaborate with the GC Digital Innovation Group, who specialize in technological resources supporting teaching, learning, and communications in an educational environment, to create a more unified system of tracking and reporting relevant data on student performance and program success within the STEM Initiative. The unified approach to STEM data across the range of Initiative programs will allow for more consistent data reporting to internal and external constituencies, a higher level of facility in exploring research questions on impact and efficacy within programs, and a single source for information in performing longitudinal studies of project/program success via critical variables such as student learning, majors, graduation rates, effects of special initiatives (e.g., SIs). Progress on the STEM Dashboard in 2013-2014 included: 1) audit of dashboard data points to insure they address BOR template requirements, 2) initial extraction of data and testing of data selection and download user interface; 3) generate a "wish list" of basics reports generated by the dashboard; and 4) populate the dashboard database with previous years' data.

Finally, a key component to STEM Initiative success at Georgia College is the broad and deeply rooted culture of engaged STEM activities across the university. These activities demonstrate the strong and genuine institutional commitment to excellence in mathematics and the sciences for GC and the broader community. GC selected "Science to Serve" as an academic program of distinction as part of a Strategic Focusing Initiative. The Science Education Center coordinates a number of engaging activities throughout the year, including the Regional Science and Engineering Fair, Summer Science Camp, the SMART Institute in mathematics and science for in-service teachers, and the Young Scientists Academy summer program. The "Innovative Course-building Group" faculty incorporate service learning projects into STEM courses with actual topics or problems in the local community, following the NSF's SENCER model of civic engagement. The theme for the Georgia College Quality Enhancement Plan is "Building a Culture of Engaged Learning" and focuses on community-based engaged learning. The QEP implementation utilizes a mini-grant program modeled on the STEM Initiative mini-grant program discussed below. An innovative 100-seat teaching computer lab, housed in the Library and Instructional Technology Center, allows a technology rich, emporium-style course-redesigned College Algebra course. Many scholarships and undergraduate research opportunities are available to STEM majors, and the Community Action Team in Science (CATS) provides multiple Service Learning opportunities. Community outreach programs for P-12 students and teachers make extensive use of the GC planetarium, the Greenhouse, and the Natural History Museum on campus. And this is just a sample of the rich and engaging STEM culture at GC.

C. *Program Challenges* – This section covers challenges that continue to face your institution's STEM Initiative program:

1. What challenges has your program encountered in **increasing the number of STEM majors**?

   One challenge encountered at GC with respect to increasing numbers of STEM majors is that of capacity. Some degree programs (e.g., biology, chemistry) are at or very near enrollment capacity. Significant growth in these programs would require faculty and facilities beyond the scope of STEM Initiative funding and current GC resources. However, other programs at GC have contributed to enrollment increases in certain STEM programs (e.g., physics, mathematics).

2. What challenges has your program encountered in **increasing STEM degree production**?

   The challenge of capacity in certain programs mentioned above is also pertinent to STEM degree production. Additionally, although strong improvements have been made at GC in reducing DFW rates across introductory STEM courses since the implementation of STEM initiative programs, these rates are not yet to satisfactory levels. Even with such improvements, DFW rates in STEM courses are still among the highest such rates when compared to courses in other disciplines. High course attrition is a primary factor in lower than expected graduation rates and a longer average time-to-degree. Thus, improvements in successful STEM course completion would positively impact persistence in STEM degree programs and degree production.

   Although there are data showing that the FOCUS program is having a positive effective on participants (GC students, the teachers they work with and P-12 students), enrollment the FOCUS course needs to be increased. To address this issue, the FOCUS program coordinator with the support of the Dean of the College of Education will do the following: 1) rewrite the course description so that it is attractive to a broader range of STEM majors; 2) revise promotional materials and the FOCUS recruiting plan; and 3) collaborate with the new centralize student advising office to target specific majors where FOCUS would serve as an attractive elective course.

3. Are there any **program-specific** (i.e. mini-grants, service learning opportunities) challenges that your program has encountered?

   For the STEM service learning course, finding appropriate placements for service learning students is consistently a challenge because of the limited number of quality placements in our immediate area and the demands on these placements by undergraduate and graduate initial certification programs. This issue has been mitigated to some degree by the recent hiring of a placement coordinator in the College of Education to serve as a liaison to the schools for education and service learning placements. This position is not funded by the STEM Initiative, but it will serve as an important support resource in the College of Education with particular benefit for the STEM service learning course.

   For the STEM Retention Initiative, we experienced some unintended consequences/challenges in FY2014 by virtue of the expansion of the program. The number of SIs requested has increased significantly since FY2011, growing from approximate 6-7 per semester to more than 60 per semester (some funded outside of the STEM Initiative). Though there is strong institutional support of this program, the demand for supplemental instruction still far outpaces the program's capacity. GC does have a full time coordinator of the SI program who also directs the Learning Center. This position is a solid foundation for sustaining this initiative's success, and she continues to develop training programs for SI leaders and assessment strategies to determine the most efficacious practices.

4. Are there any **other challenges** that your program has encountered that you have not described (i.e. departmental buy-in, personnel issues)

D. Did you implement the STEM Initiative program at your institution **as described in your project proposal**? Please describe any notable changes from the proposal that you made (additional project components, project deletions).

   In FY2014, no significant changes were made from the GC STEM II proposal. A minor change was the less than full implementation of the STEM Pipeline project to bring together a larger group of STEM and STEM Education stakeholders for discussion and sharing of resources regarding recruiting, advising, service learning, internships, data collection, collaboration, dissemination, etc. Although the STEM Dashboard project described above did move forward as planned in FY2012 and several smaller collaborations across units occurred, the broader scale involvement envisioned in the STEM Pipeline has not yet been fully realized.

II. Data Sheet Addendum

** Please see attached spreadsheet. **

III. Programmatic Components

A. Faculty Mini-grants

1. Please provide a list of the mini-grants provided by your institution as part of its STEM Initiative for FY2014. You may use the following table or some alternate format, but please be sure to provide all of the information requested:

Project Title	Faculty Investigators	Award Amount	Brief Description (4-5 sentences)	Key Research/Pedagogical Outcomes
Bringing Anatomy & Physiology to Life: Building Models to Enhance Understanding of Muscular, Cardiovascular, & Endocrine Systems	Kirk Armstrong, Amanda Jarriel, and Emily Simonavice	$2,554	The purpose of this project is to enable students to build anatomical models for the muscular, circulatory, and endocrine systems to facilitate an understanding of the anatomy and associated physiological processes. Despite the advantages of supplemental pictures and videos/animations, students typically not been engaged throughout the learning process in these content areas. By providing opportunities for students to build their own anatomical model for the muscular, circulatory, and endocrine systems they will be emphasizing the connection of the anatomical structures to the physiological processes. Within three introductory courses, students will individually build anatomical models for the muscular, circulatory, and endocrine systems that will emphasize active learning not only within the introductory courses in which they are built, but will continue to assist in the learning of other courses as these students progress through their curriculum. Additionally, these anatomical models serve as an introductory mechanism for implementing active learning strategies into the STEM curriculum within the College of Health Sciences.	Assessment of the student learning objectives was completed through formative and summative evaluations. Summative evaluations included written quizzes (administered via D2L approximately 1 week after the classroom lecture and laboratory sessions of building the anatomical models) and specific questions on the final examination (administered via D2L). Formative evaluation included qualitative comments from students at the end of the laboratory sessions where models were built and at the end of the semester in which anatomical models were built. Overall, it was determined that having student develop the muscle models and circulatory models during laboratory sessions improved their understanding of the anatomy and associated physiological processes of each system. Despite the great work with the muscular and circulatory systems, the endocrine system project was not completed during the Spring, 2014 semester. Changes in faculty course loads resulted in a faculty other than Dr. Emily Simonavice teaching HSCS 2823: Physiology of Human Movement.
Researching, Learning, and Enacting Science Talk in Middle Grades Classrooms	Victoria Deneroff	$5,528	We propose to establish a K-16 professional learning community, which has as its focus an innovation in the teaching of a Georgia College STEM course: PHSC 4010. This integrated physical science course is taken by all middle grades teacher candidates as part of their preparation for certification. We will continue and deepen a design experiment into the use of science talk by teacher candidates, which has shown promising results in three previous iterations of the course. We will attempt to scaffold pre-service teachers attempts at science teaching by intentionally creating a connection with host teachers and assignments in their field placements during the Spring 2014 semester. We will introduce the innovation of including in-service middle grades science teachers as co-researchers, thus introducing them to the research base for ambitious science teaching.	We introduced the participation structure (also called activity structure) of Science Talk to the students of PHSC 4010. Students engaged in laboratory and other activities, as well as lectures and reading of the textbook with the support of a supplemental instructor (SI). They then explored their understanding through Science Talk sessions in which they "hashed out" and connected the meaning of the various information sources. In addition, we introduced the "STEM Writing Heuristic," which was an adaptation of a research-based activity structure, in order to scaffold students' ability to use evidence to support claims. Using this framework provided a way to go beyond just "writing a conclusion," which in our experience is always problematic for students. Three pre-service middle school teachers attended after-school professional development meetings. At these meetings we examined transcripts of the PHSC Science Talks, and had discussions about the significance of the students' talk. As part of the grant activities, three middle school science teachers and three pre-service teachers attended the National Science Teachers Association (NSTA) Regional Conference in Charlotte, NC. This was an opportunity for team building, as well as providing exposure to a community of enthusiastic, forward-thinking science teachers. The three middle school science teachers each teach 60 students or more, and all engaged their classes in the use of the Science Writing Heuristic. Therefore science instruction for at least 200 students was directly affected. In addition, the work was disseminated at the GSTA Conference to an audience of approximately 25 secondary teachers.
Inquiry Activities for a Learner-Centered	Michael Gleason, Ellen France, and Kasey Karen	$6,801	Our purpose is to improve student learning in genetics, a course taken early in the biology major. We are proposing to backward design from learning objectives to an evaluated	We proposed a backward design from learning objectives to an evaluated redesign of labs and related lecture-based activities in rough manner have accomplished this in two iterations of the

Genetics Course			redesign of labs and related lecture-based activities. We have identified three key learning objectives that will guide specific genetic inquiry-based activities around two foci: learner-centered modeling using models created by rapid prototypying at the Center for Biomolecular Modeling (CBM), based on research derived molecular structures, and by adoption and development of yeast-based wet-labs illustrating a variety of molecular methods and Mendelian conepts. We anticipate that our assessment-guided efforts will result in newly created materials that will promote deep critical thinking, experimental reasoning, and improve student attitudes for scientific thinking and inquiry. Other expected outcomes include increased retention and success of students in our major; and future opportunities for us to disseminate via workshop and publication, for our students to publish, and us to apply for extramural funds to support further rounds of learner-centered improvements in genetics and other biology courses.	course. Our preliminary assessments support the idea that our curricular improvements have promoter deeper critical thinking, better experimental reasoning. Future studies will evaluate these outcomes in greater depth, and as well begin to assess improve student attitudes for scientific thinking and inquiry. Two rounds of curriculum development resulted in a draft laboratory manual created by the end of the fall 2013 term (this was largely the efforts of Gleason and Karen) that was revised upon consultation with our colleagues at CBM and then further developed by France this spring. In addition a new partner to our genetics instructor group, a population geneticist, Dr. David Weese, will contribute to the development of our laboratory module that addresses this area.
STEM Professional Learning Community (PLC) for Building a Model of Culturally Responsive STEM Education in Rural Middle Georgia	Rui Kang and Catrena Lisse	$7,000	Our STEM-PLC represents one of the earliest efforts in building a rural-based, culturally responsive STEM education model. The STEM-PLC is supported by a strong theoretical framework, which incorporates multicultural theories, learning theories, and organizational change theories. The STEM- PLC has a wide representation from Early College (EC), College of Education, and Arts & Science. It is built upon a long-term collaborative culture between Georgia College and EC and a strong administrative support. Expected outcomes related to student learning include improved attitudes toward STEM, improved achievement in STEM fields, and further developed skills in problem solving, inquiry and research, communication, technology, and critical thinking. Outcomes for EC teachers and MAT students, as well as university faculty members include enhanced pedagogical content knowledge and social learning skills, a better understanding of students' needs in STEM learning, as well as leadership capacity, especially in terms of leading STEM-focused workshops at state, regional, or national levels. The early stage of this STEM-PLC (2014-2015) also facilitates long- term goals of this community, which include (1) creating and disseminating a curriculum kit with strong focuses on culturally responsive teaching and a rural science theme, and (2) establish EC as a model site for rural-based, culturally responsive STEM education.	During the end-of-year interviews of five EC teachers, we identified three major themes as testimonies to the success of our community building. EC teachers have developed a clear recognition of the interconnected nature of scientific knowledge. All five teachers agreed that the various subjects subsumed under the notion of STEM should not be taught in isolation. EC teachers have shown a strong commitment to PBL. Science teachers also tend to see PBL as beneficial in cultivating academic confidence and metacognitive skills such as goal setting and self-evaluation. EC teachers have shown a firm belief that STEM education, like scientific literacy, is important for *all* students. A needs-assessment survey (Is Science Me?) was administered to EC's 8th, 9th, and 10th grade students (N =120). This survey has given us the baseline data in terms of EC students' aspirations for pursuing science majors and careers, as well as their attitudes toward STEM learning. Another major accomplishment through STEM-PLC was the organization of an internal science fair participated by all EC middle and high school students. Ten projects also entered the regional science fair. Six students received the honor of 1st place winner.
Clay Modeling of the Musculoskeletal System: Does Active Learning Increase Retention and Comprehension	Kelly Massey	$4,284	In KINS 3013-Structural Kinesiology, the focus of the course is a detailed study into the musculoskeletal system and joint action. The course contains a lot of memorization: skeletal muscle origin, insertions, innervations and muscle/joint actions, but there is also an applied component for the content. Group study has been incorporated into the course to increase knowledge retention and comprehension however group interaction has been seen to be minimal. Two studies have looked at group construction of skeletal muscle models using clay during class time in assisting with the active learning of muscle origin,	Group study has been incorporated into the course to increase knowledge retention and comprehension however group interaction has been seen to be minimal. Group construction of skeletal muscle models using clay during class time was adding to potentially assist with the active learning of muscle origin, insertion and actions. Weekly **"Clay Days"** were added in which each group concentrated on creating the muscles discussed and interacting within the group on the joint actions of those muscles on the model. Although the results seen from group Exams as well as the Final individual Exam for the classes observed, incorporating

			insertion and actions. Both of these studies had good end resulIts. Adding this active learning instructional method into the course could be beneficial in examining the issue of how active group interaction and group discussion of the material can assist in each student's individual attainment and understanding of the course material. The goal of this project is to have each student in each group participate in the creation of clay skeletal muscles for every muscle in the human body. Objectives include each student successfully identifying origins, insertions, innervations and actions of every muscle at each joint during both group assessment as well as individual testing.	the clay modeling did not produce the anticipated results on formal assessments, when used in conjunction with the groups. However, student opinion surveys showed that **30.77%** of the class enjoyed the use of the clay modeling VERY MUCH, and **46.15%** SOMEWHAT enjoyed the activity. **46.15%** found the activity to be SOMEWHAT helpful in studying for the course whereas **7.69%** found it EXTREMELY helpful in studying for the course. This method could potentially be refined and expanded to elicit increased retention and understanding among this subject matter.
Teaching the Science within Local Dirty Jobs	Brian Mumma	$7,000	This STEM project will be a learning community partnership for exploring, engaging, and understanding the science of local dirty jobs that comprise our community infrastructure and make our everyday lifestyle of convenience possible. The partnership includes college students at various collegiate levels for peer mentoring, pre-education candidates, 6-12 classroom teachers, and working community members. The STEM partnership will be based on further extending a current format of "storytelling for learning and understanding through student agency" of the GC1Y course titled, *Local Dirty Jobs*. This format is composed of students; 1.) learning the science of a dirty job through journalistic interview of a mentor that performs the job, 2.) developing an understanding of the science through apprenticing with the mentor by engaging in doing the job, and then 3.) teaching the science through the creation of a Local Dirty Job video episode that explains the science of the job. The process of this engagement for learning is centered in the digital storytelling media, which our current students, as digital natives, are regularly immersed within and prefer as their communication for learning. The community partnership will include a "learn it and teach it forward" collaboration between College of Education faculty, Middle Grade Cohort students, GC1Y course Freshmen students, Early College students, and local community members that are engaged in performing dirty jobs that support our community.	The sections for GC1Y: Local Dirty Jobs enrolled 25 students for Fall 2013 and 26 students for Spring 2014 thereby serving 51 students. Students in this course first worked independently to interview community members engaged in local dirty jobs in a journalistic approach. The students then selected partners to work in 3 person production teams to produce the video episode that focuses on explaining the science behind the dirty job in which they apprentice and teaching how the job function makes everyday life possible. The Colorado Learning about Science Survey indicated that students had significant gains in motivation, problem solving, and scientific literacy.
Compiling an Inquiry-based Activity Course Packer for the Life and Earth Science Course for Pre-Early Science course for Pre-Early Childhood Education majors - Part 2	Christine Mutiti, Lyndall Muschell, and Samuel Mutiti	$3,813	All prospective K-5 teachers should possess a broad knowledge of science among others. Students that plan to join the cohort in their junior year here at Georgia College (GC) are required to complete a number of courses in area F, including the life and earth science course (ISCI 2001). Students who have taken this course in the past had indicated that they were expecting this to be a course on the methods of teaching science. However, this course focused on the fundamental aspects of biology, earth, and environmental science, and has thus been a science content course. Through the collaborative efforts of STEM and Education faculty, the main goal of the first part of this project was to design an inquiry-based activity packet to incorporate into the course. This second part focuses on refining the activity packet that has been developed thus far and purchase materials that will augment and	This project was the second part of a teaching innovation project that was aimed at improving student learning of science content by incorporating inquiry-based activities. We continued to administer pre and post-test as well as the change in attitude toward science assessment. Regarding attitudes towards science, by the end of the course a significant proportion of the students indicated that teaching the process of science in the elementary classroom was important and that they hoped to excite their own students about science. Students also indicated that they would enjoy the hands-on activities when teaching science. However, by the end of the course, there was only a small change in proportion of students who indicated that science would be their preferred subject to teach. Students continued to score significantly higher on the post-tests than on the pre-tests

			enhance student learning.	indicating that there was science content learned from the course. Of the four semesters during which learning was assessed through pre/post-tests, the Fall 2013 group generally scored significantly worse than all the rest in both the pre-test and the post test. The pre-and post-tests may not effectively assess student learning as well as the impact of the inquiry-based activities (as a teaching innovation) on student learning because some students don't take the tests, especially the post-test, seriously. Based on our experience, the pre and post assessment need to be revised to combine science content questions as well as specific questions that assess science attitudes rather than administering a separate science attitude survey. An alternative assessment tool needs to be devised to effectively assess student learning.
The Tutoring Program in Computer Science	Gita Phelps	$7,000	The purpose of this grant is to continue the CS tutoring program. We anticipate that the tutoring program will improve retention rates in computer science entry-level courses. This grant will provide opportunities for computer science junior and senior students to teach. As tutors review the material previously covered, the upperclassmen may gain insight and improve their CS knowledge. We believe the tutoring program will strengthen the CS majors both in number and in knowledge learned and support non-science students taking CSCI 1301 and CSCI 1302 to fulfill core requirements.	The number of students visiting the tutor increased as professors repeatedly mentioned the tutors' schedules. However in Fall 2013 we also introduced Supplemental Instructors (Sis) for CSCI 1301 and see a reduction on the number of visits to the CS tutors. We conclude that the tutoring program benefits the most for 'C' students. More specifically, the tutoring program prevents some 'C' students from dropping to 'DFW'; or pulls some 'DFW' students to 'C' group. Therefore, the percentage of 'C' students by visiting the tutoring program is significantly higher than the others who do not. However, the data show that the tutoring program did not positively change the grade distribution of 'A-B', or 'W' students, although more than 20 percent of 'A-B' and 'W' students visited the program.
Building Capacity in a Whole-School STEM Learning Community at NEHS: Improving Student Achievement, Teacher Education and STEM Professional Learning	Sandra Webb	$7,000	Northeast High School STEM Learning Community (NHS-STEM-LC) includes teachers, administrators, GC faculty, MAT candidates, and NHS students. Its mission is to improve the quality of STEM education, offer collaborative STEM experiences during MAT teacher preparation, provide STEM experiences for underrepresented students, and facilitate professional development for K-12 teachers and GCSU faculty. NHS-STEM-LC, formed in January 2011, has an interdisciplinary STEM focus with emphasis on technology and literacy as tools for learning. Initially, NHS-STEM-LC consisted of nine teachers, two from each of the major academic departments and a technology teacher. During the 2013-1014 academic year, Dr. Quintin Green, Principal of NHS, will elevate STEM as a primary whole-school reform focus and begin preparing an application for Georgia STEM School designation. Professional learning for all teachers in the conceptual framework of the NHS-STEM-LC, including an inquiry approach (5 E's), Understanding by Design, interdisciplinary units, and lesson study will be necessary. Teachers will participate in academic departments in lesson study twice during the year, fall and spring. Teachers, GCSU consultants, and MAT students will collaborate in designing lessons, implementing lesson study, and examining evidence of student learning outcomes. In addition, the NHS-STEM-LC supports pathways to STEM	In 2013-14, the NHS-STEM-LC invested in school wide professional development of the conceptual framework of inquiry and interdisciplinary lesson study to support critical thinking, content learning and engagement across content and CTAE subjects. By spring 2014, the number of teachers participating in lesson study tripled and there was a noticeable increase in teachers representing technical and resource curriculums in the CTAE departments. Teachers reported an increase in student learning outcomes by using engaged learning strategies, student centered activities, and critical reflection in their lessons. The STEM Club at Northeast High School maintained approximately 80 members on the club roster and is a popular student organization at Northeast High School. This year, the STEM Club members attended monthly programs with Ruth Eilers from Georgia College Academic Outreach and participated in three field trip, including a fall environmental field trip to Lake Laurel and a spring field trip to Jekyll Island Turtle Rescue and Tidewater Nature Center, sponsored by the STEM grant, Bibb County Gear Up Grant, and fundraising by club members. The final field trip of the year was a campus visit to Georgia College for a math exploration, STEM Challenge, and campus tour. Faculty members Dr. Rodica Cazacu and Dr. Vicki Deneroff and staff members, Ruth Eilers and Emmanuel Little assisted with this on campus experience.

			for NHS STEM Scholars and interested students. An after-school STEM Club provides opportunities for students, teachers, and GCSU faculty and MAT candidates to explore interests and issues in STEM, provide career information, sponsor field trips, and provide further mentoring for NHS students in projects and other programs in STEM.	STEM Club students and Graduate Assistant, Jim Fuerniss, created a digital story of the field trip to Jekyll Island to use to document their experiences.
Devleoping a new GC2Y course: Water & Society	Caralyn Zehnder and Samuel Mutiti	$5,750	In spring 2014, the Environmental Science program will be offering its first GC2Y course, Global Perspectives: Water & Society taught by Dr. Sam Mutiti. We propose to use this STEM minigrant funding to develop four course modules to be used by any professor teaching this course. These modules will feature student-centered engaged learning activities. Additionally, we propose to create assessment tools (rubrics, pretest / posttest) to be used to evaluate student learning. We will use the method of backward course design to create meaningful class activities and assessments.	We were successful in the development of a new GC2Y course: *Water & Society* and we designed a set of course modules that future instructors can use in this course. Dr. Sam Mutiti taught the course this past spring. 26 students enrolled in the course (and there were more who wanted to get in, but the classroom was full). Of these students, 15 were non-STEM majors and 11 were STEM majors. Dr. Mutiti organized multiple field trips for the students including a tour of the Milledgeville Wastewater Treatment Plant, the Milledgeville Drinking Water Treatment Plant, stream sampling at Fishing Creek and stream sampling at Champion Creek. Student feedback indicated that they really enjoyed these opportunities and it gave them a chance to directly connect the science about water purification and pollution with their own water use. We used a pretest and posttest to assess student understanding of the scientific method, water pollution, water policy, and hydrology. Students showed improvement in all of the questions except for one when we examine the multiple-choice section of the pretest and posttest results. Similarly, students showed improvement in their understanding of regional and global water issues as shown by the improved scores in two out of three questions on the short answer portion of the test.

2. State the **funding rate** for mini-grants at your institution (i.e. number of grants funded vs. total number of proposals received)? Discuss how proposals were **judged and awarded**.

   In FY14, the GC STEM mini-grants program was able to fund 10 out of the 14 mini-grant proposal applications received, a funding rate of 71.4%. At GC, mini-grant proposals are solicited in an open call for proposals, typically in mid-spring around the time of the mini-grant STEM Symposium event. Proposals are reviewed by a faculty review committee of approximately six volunteer faculty members representing a cross-section of STEM and STEM education disciplines. All proposals are first reviewed and rated independently by each faculty reviewer using the rubric shown below.

Criteria	Possible Points
Identified need is challenging and compelling	10
Goals and objectives are significant and relate to teaching and learning to improve in STEM courses	20
Potential for broad impact	10
Project plan is based on identified need and will lead to successful implementation of project	15
Study is well designed and describes appropriate experimental or qualitative methodology and measures for examining the effects of the project on student learning	20

Plan for disseminating results	5
Plan for sustaining project	5
Evidence of collaboration	5
Budget expenditures are reasonable, justified, and directly linked to proposed plan	10
Total Possible Points	**100**

After the independent ratings are collected, the faculty review committee meets in person to discuss the merits and potential impact of each proposal. Often in the process of the thorough discussion, with the opportunity for a variety of points of view to be brought to light, the priority order for funding will shift in large or small degrees from the linear order resulting from the numerical rubric scores. Depending on the number of proposals and the points of discussion within each proposal, the faculty review committee meeting can take from two to five hours. Only projects judged meritorious and feasible through this process have the opportunity to be funded, and from the eligible proposals, the highest ranked proposals are funded within the scope of the available mini-grants funds for the particular fiscal year. The review process also results in recommendations from the committee on ways that projects can be strengthened.

3. For any of the mini-grants listed, do you **have evaluation data or other evidence suggesting the efficacy of the projects**? Also, please discuss the broader impacts for these projects (i.e. changes to instructional approaches, changes to departmental policies, etc.).

   There is consistent evidence across the set of mini-grant projects that demonstrates STEM funding is affecting student performance and classroom practices. Studies that focused on undergraduate STEM education demonstrated significant pre/post learning gains (e.g., genetics lab activities and a new environmental science lab course), significant differences in DFW and AB rates and test scores in math and science for participants in tutoring and special programs (e.g., CS tutoring program) versus control groups, and greater gains for students who attended more tutoring sessions. Learning community projects resulted in the development of lesson plans that incorporated engaged learning strategies, student centered activities, and critical reflection, which P-12 teachers reported improved student learning outcomes, enhanced an existing high school STEM club and provided opportunities for students to participate in an internal science fair.

   Funded programs have implemented new approaches to teaching in introductory STEM classes. These include student-produced videos to document how STEM is used in local dirty jobs, innovative labs in environmental science and genetics, hands-on anatomical model construction lab modules, tutoring programs in computer science, and inquiry-based activities packets in teacher preparation courses. Learning community projects have created science fairs, provided opportunities for learning community participation for Georgia College STEM fields with middle grades and high school teachers, and supported training initiatives for middle grades and high school teachers to improve their STEM teaching practices.

B. Service Learning Opportunities (i.e. FOCUS-derived projects)

1. Briefly describe the **operation of your institution's service learning opportunity** or FOCUS-derived project for FY2014, including the following:

   a. Name of project(s) or other branding

      The STEM Service Learning course is often referred to as the "FOCUS" course, with reference to the model program from the University of Georgia: Fostering Our Community's Understanding of Science. However, the official course name is EDIS 4425, or Education Integrative Studies, and the catalog description is as follows:

      EDIS 4425. SEMINAR: EXPERIENCE TEACHING FOR MATHEMATICS AND

SCIENCE MAJORS. (1-4-3)

Prerequisite: Students must have completed 12 hours in major and have at least 3.0 GPA. This course is designed to provide mathematics and science majors experience in middle and high school classrooms observing and teaching in their content fields. Seminar will include student reflection and discussion of mathematical and science literature and research. Visiting speakers by faculty and local educators will focus on current issues in the education field. This course is exclusive of GCSU Cohort programs. This course is repeatable for credit.

b. Key Partners for your Project (i.e. Departments/Schools at your institution, participating P-12 schools/school districts, area businesses, etc.)
The Department of Early Childhood and Middle Grades Education is the principal partner, housing the EDIS 4425 course in its academic program and the faculty appointment for the course instructor. The Department of Mathematics is also a notable partner, as EDIS 4425 is a required course in the B.S. in Mathematics with a Teaching Concentration degree program. Other key partners are the following P-12 schools that have collaborated with student placements for the field component of the course:
    - Baldwin County High School
    - Oak Hill Middle School
    - Georgia College Early College
    - Georgia Military College

c. Data regarding participants (students taking part in project, number/classes of P-12 students engaged through project, number of teachers taking part, etc.)

GC Students Enrolled in EDIS 4425 in 2013-2014:

Fall 2013 (7 enrolled)	**Spring 2014 (9 enrolled)**
Boakye, Samuel A.	Bruce, Daniel
Cook, Barry W.	Cook, Barry W.
Gilbreth, Sally M.	Davis, Madison
Heath, Misty	Frank, Suzanne
Ozier, Lydia	Harrison, Lindsey
Stephansen, Lauren	Monaco, Zachary
Tharpe, Brittany	Ozier, Lydia
	Stephansen, Lauren
	Tharpe, Brittany

Numbers of teachers/P-12 students engaged through project in 2013-2014:

2013-2014 Placements
Baldwin High School – 5
Oak Hill Middle School – 5
Georgia College Early College – 4
Georgia Military College – 2

Thus, a total of 8 distinct classrooms/P-12 teachers participated in the STEM service learning course by hosting GC students for the field component. Nearly 300 distinct P-12 students were engaged through the project in 2013-2014.

d. Primary activities and their operation

Students work three hours each week on math and science with P-12 students and a partner

teacher in the schools. Students develop Georgia Performance Standards and Core Curriculum GPS (GPS/CCGPS) inquiry lessons and hands-on activities with their partner teachers and keep a weekly reflective journal. The course includes a weekly one-hour seminar in which students share experiences and learn about GPS/CCGPS and inquiry-based teaching. Faculty and students will meet to share ideas, to provide information about teacher certification programs, to recruit students into teaching, and to examine and expand on STEM content in P-12 settings. Students also conduct collaborative service learning research that focuses on P-12 learner outcomes using data they collect in their placements to judge their effectiveness and to provide data for the overall FOCUS evaluation. Dr. Connie Rickenbaker coordinates the FOCUS course activities, supervises placements, teaches the seminar, and collaborates to implement best practices grounded in the National Service-Learning Clearinghouse Standards and Indicators for Effective Service-Learning Practices.

e. Any outcomes data demonstrating the project's efficacy or effectiveness.

FOCUS student survey data (n=15) from FY14 rated effects they had on students and teachers:

- 100% agreed or strongly agreed that their students learned more math/science content.
- 100% agreed or strongly agreed that their students became more interested in math/science.
- 86.7% agreed or strongly agreed that their students were able to do more hands on activities.
- 100% agreed or strongly agreed that their students were provided more individual attention.
- 66.7% agreed or strongly agreed that their teachers learned about new resources or materials.
- 86.7% agreed or strongly agreed that their teachers learned new teaching ideas or activities.

Asked about the effect of FOCUS participation on themselves:

- 100% agreed or strongly agreed that they better understood schools and challenges they face.
- 100% agreed or strongly agreed that they better understood their own content.
- 80.0% agreed or strongly agreed that they were interested in teaching as a career.

C. Institution-Specific Projects

1. **Identify your institution-specific project(s)** outlined in your proposal for FY2012 (i.e. 4-Year Undergraduate Research Experience, Academy for Future Teachers, MESA, summer bridge programs, peer learning communities, STEM tutoring/learning centers, etc.). Discuss any specific branding.

   The **STEM Retention Initiative** at GC focuses primarily on the model of peer-assisted learning provided through supplemental instruction: a supplemental instruction leader (SI) is an employable, advanced undergraduate student who attends all lectures in a class, prepares for, and provides collaborative learning sessions (usually twice weekly) to students populating the class. This strategy expands on existing institutional support such as peer tutoring (the Learning Center) and online tutoring (via SmartThinking.com) at GC using an additional resource with proven success in increasing STEM retention rates. Beginning fall semester, 2012, GC's SI program was centralized under the Coordinator of the Learning Center. Centralizing this program afforded GC an opportunity to invest in more thoroughly training the SI Leaders, develop assessment tools, refine the data collection process, and better evaluate the effectiveness of the program across the institution.

   The USG STEM Initiative grant supported the professional development of the new coordinator by sending her to the International Center for Supplemental Instruction for SI Supervisor Training at the University of Missouri, Kansas City. Intensive three-day training sessions provided an improved, comprehensive training protocol complete with tools to equip new SI Leaders for further success. New procedures for training, data collection, assessment, and evaluations were implemented. Funds were specifically appropriated for training hours for all SI Leaders (48 Leaders) for Spring 2014 providing improved readiness and delivery of the SI program. Additional training for all leaders was

provided throughout the semester to support the program.

2. Provide data regarding the **level of participation** in each of these projects (i.e. number of faculty participants, number of student participants). Discuss their **scope** (i.e. oriented toward incoming freshmen, upperclassmen, STEM majors, education majors, all students, etc.)

   The STEM Retention Initiative has expanded significantly over the past two years (see chart below). Faculty requests for SI leader support have increased 27% between Fall 2012 and Spring 2014. STEM Initiative funds have been allocated to support increases in the total number of SIs funded, with a near even match by Georgia College.

Semester	TOTAL request	STEM Courses requesting SI	STEM funded
Fall 2012	48	35	23
Spring 2013	53	41	22
Fall 2013	62	49	26
Spring 2014	63	48	31

   The selection criteria for SI support are as follows.

- Historically high DWF rate
- Gateway courses for STEM fields
- Number of students potentially served per section/course (enrollment)
- Number of sections
- Predominately 1000 and 2000 level courses, targeting freshmen and sophomore students
- Lower overall course GPA

   The target audience was primarily freshmen and some sophomores in courses with an assigned SI. Student participation and impact are summarized in the table below.

Semester	Unique Students Served	Visits	Contact Hours	GPA Gain	% of students attending
Fall 2013	750	4420	6630	+.57	61%
Spring 2014	602	2518	3777	+.57	55%

3. Discuss the **activities and operation** of your institution-specific project(s), including any efforts to connect multiple projects for synergistic impacts.

   The primary activities for the student SIs are to attend all lectures in a class, prepare for, and provide tutoring sessions (usually twice weekly) to students from the class. In addition to this, group training sessions are provided at the beginning of the semester so that clear expectations for SIs and the program can be communicated and also so that questions and concerns can be addressed. When SIs are in need of materials or resources in order to perform their job effectively, such needs can be addressed at group meetings or through their assigned faculty member.

4. Provide any available **outcomes data demonstrating the efficacy or effectiveness of the project(s)**.

   The SI Program at GC provided both intrinsic and extrinsic value for the students served as well as for the SI leaders themselves. Evaluations from the students served indicate newly acquired study skills, increased content knowledge, improved communication skills, and deepened personal confidence with academic success, leading to higher probability of retention, progression, and

graduation. The SI leaders expressed tremendous rewards with career clarity, confidence, communication skills, organizational and time management skills as well as a profound respect for their assigned professor and his/her commitment to higher education and learning. Many faculty endorsed and recommended their SI leaders for summer research projects; seven SI leaders were accepted and able to conduct research in STEM related fields assisting with engaged, real-world experiences in their chosen fields. A significant number of our students went on to present at conferences and are collaborating with ongoing research with their departments.

IV. Future Efforts

A. Please discuss **dissemination efforts** for best practices or research findings identified through participation in the USG STEM Initiative.

Dissemination efforts have been a particular strength of the STEM Initiative at GC. Given below is an extensive list of examples of presentations, posters, and community outreach efforts by GC faculty, students, and staff that have been specifically supported by and/or resulted from projects and programs within the GC STEM Initiative. Worth noting is the fact that although the list is extensive, it is not exhaustive.

League for Innovation STEMtech 2013 Conference - Atlanta, GA, October 27 - 30, 2013

Presentations:

- *STEM for Real! Shaping a Multidisciplinary Learning Community Through Inquiry* – Sandra Webb, Georgia College, Robert Winborne, Tara Jones-Lawrence, and Donna Walker-Thompson, Northeast High School
- *Science to Serve: Growing Your Own STEM Initiative* – Rosalie Richards, Georgia College

Georgia Science Teachers Association – Macon Marriott City Center, February 6-8, 2014

Presentations:

- *Writing in STEM for Secondary Students* – Victoria Deneroff, Rosalie Richards, Georgia College, Nikki Grimes, Sharon Hood, Lauren Parton, Marquita Clayton, Tynisha Harris, Georgia College Early College
- *Active-Learning Strategies for Teaching Environmental Science* – Caralyn Zehnder, Kalina Manoylov, Christi Mutiti, Sam Mutiti, Allison Vandevoort, Georgia College
- *Using the Climate Debate to Teach Chemistry* – Julia Metzker, Catrena Lisse, Rosalie Richards, Chavonda Mills, Kimberly Cossey, Georgia College

Georgia Scholarship of STEM Teaching and Learning Conference - Georgia Southern University, March 7, 2014

Presentations:

- *Building Learning Experiences that Matter: Using Civic Issues to Engage Students with Science* – Julia Metzker, Caralyn Zehnder, Kimberley Cossey, Georgia College
- *Critical Thinking and the Languages of STEM* – Sally Gilbreth (student) and Connie Rickenbaker,, Georgia College
- *Real World STEM: the Possibilities for Transforming Teaching and Learning Through Inquiry* – Sandra Webb, Jim Fuerniss, Georgia College, Donna Walker-Thompson, Melanie Mitchell, Justen Eason, Guy Storm, Monica Williams, David Peterson, Northeast High School
- *The Interview Project: Learning Children's Mathematics* – Angel Abney and Doris Santarone, Georgia College
- *Beyond Implementation of a Supplemental Instruction Program Lie the Challenges of Determine Course-level Gains in*

Learning and Longitudinal Success Like Retention - Jeanne Haslam, Mike Gleason, Gita Phelps, Darin Mohr, Kasey Karen, Catrena Lisse, Rosalie Richards, Georgia College

- *"I Didn't Know Science Could be Fun!" Engaging Adolescents in Science in an Afterschool STEM Club* – Sandra Webb, Ruth Eilers, Jim Fuerniss, Georgia College, Jackie Bowman, Northeast High School
- *Successful Use of Group Assessment Procedures in an Undergraduate Course* – Kelly P. Massey, Georgia College
- *Inquiry-based Activities for Life and Earth Science Course for Pre-Early Childhood Education Majors* – Christine Mutiti, Lyndall Muschell, Samuel Mutiti, Georgia College
- *The Tutoring Program in Computer Science* – Gita Phelps and Yi Liu, Georgia College
- *"When Scientists Look at Their Data, They Don't Know the Answer:" Talking Science in a University Introductory Science Course* – Victoria Deneroff, Rosalie Richards, Georgia College, Markeeta Clayton, Oak Hill Middle School

Poster Presentations:

- *Inquiry Activities for a Learning-centered Genetics Course* – Michael Gleason, Ellen France, Kasey Karen, Georgia College
- *Clay Modeling of the Musculoskeletal System: Does Active Learning Increase Retention and Comprehension* – Kelly Massey, Georgia College
- *STEM II @ Georgia College: Building Capacity* – Rosalie Richards, Charles Martin, Ryan Brown, Georgia College
- *Assessing the Effects of a Teaching Course on Biology Graduate Student Teaching Assistants* – Caralyn Zehnder, Georgia College

Middle Georgia Diversity in Education Conference 2014 – Georgia College, Milledgeville, Georgia, March 24, 2014

Presentations:

- *Poverty is a Bull Elephant! Teachers Designing Instruction with Poverty in Mind in One Thriving Priority High School* – Sandra Webb, Jim Fuerniss, Georgia College, Donna Walker, Robert Randall, Justen Eason, Jarvis Denmark, Northeast High School
- *Teaching Science for Social Justice* – Victoria Deneroff, Georgia College

Posters:

- *The STEM Equity Elephant* – Rosalie Richards, Georgia College

77th Annual Meeting of the Southern Sociological Society – Charlotte Marriott City Center, Charlotte, North Carolina, April 2-5, 2014

Presentations:

- *Chasing STEM Equity: A Look Ahead* – Rosalie Richards, Georgia College

American Educational Research Association Annual Meeting 2014 – Pennsylvania Convention Center, Philadelphia, Pennsylvania, April 3-7, 2014

Presentations:

- *Middle-Level Science Teacher Education Without Boundaries: Integration 6-16 Curriculum* – Victoria Deneroff, Georgia College
- *Inquiry-based Multidisciplinary STEM and Lesson Study as Cornerstones in Innovating Professional Learning for Secondary Teachers* – Sandra Webb, Georgia College

2014 USG Teaching and Learning Conference – University of Georgia Hotel and Conference Center, Athens, Georgia, April 17-18, 2014

Presentations:

- *Dialogue for Deep Learning* – Victoria Deneroff and Rosalie Richards, Georgia College
- *SEE-I: A Critical Thinking Strategy* – Misty Heath (student) and Connie Rickenbaker, Georgia College
- *Teaching the Science Within Local Dirty Jobs* – Brian Mumma, Georgia College

Further strengths in future dissemination for the STEM Initiative will be realized with the STEM Dashboard project, described in section I-B-2 above. As noted above, the fully operational STEM Dashboard will allow for institutional monitoring and dissemination of the effectiveness of STEM efforts by tracking success indicators such as the numbers of majors and graduates, retention rates of majors, grades and performance of graduate admissions tests, and successful job placements.

B. Please identify any **external grants** (e.g. NSF, Department of Education, private/foundation) for which you have applied based on support received for the STEM Initiative. Indicate whether any applications have been successful.

Green Jobs Project-Integrative STEM Research Experience, American Honda Foundation, $34,780, Principal Investigator: Dr. Rui Kang

Description: Georgia College & State University (GC) and Georgia College Early College (GCEC) form a close partnership to promote interdisciplinary STEM project-based learning in rural middle Georgia. The project team consists of 13 middle- and high-school teachers, one principal, three university faculty members, and undergraduate mentors. The project serves 240 middle- and high-school students (Grades 7-12) from low-income families. All of the 240 students are first-generation college candidates; over 70% are African American students. The interdisciplinary STEM project-based learning has strong focuses on research and writing. Student research projects will center on the overarching theme of sustainable economic development, which gives the project its title, "Green Jobs Project." Students will form small research groups, with each group focusing on one of the five subthemes: solar energy, wind energy, water quality and improvement, soil and agricultural practices, and green attitudes and behavior. Short-term measurable outcomes will assess students' scientific content knowledge, research skills, writing skills, as well as variables in the affective domain such as motivation/goal orientations, self-efficacy, and interests in STEM degrees and careers. Long-term impact of this project include enrollment and performance in college-level STEM courses, science and math test scores, admission to colleges/universities, and choice of STEM majors and careers.

C. Will your institution's STEM Initiative program for FY2015 involve **any notable changes** from your FY2014 program? If so, please explain any changes and the rationale for them.

The STEM Initiative program for FY15 at Georgia College will not change significantly from the FY14 program. However, Rosalie Richards who had been a co-coordinator of the GC STEM Initiative will not be returning to Georgia College in FY15. Ryan Brown will assume the role of co-coordinator for FY15. Charles Martin will remain a co-coordinator of the GC STEM Initiative.