Guilford County Schools-North Carolina A&T NASA K-12 Partnership

Enhancing Earth System Science Education in
Guilford County School Central Region Secondary Schools

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**Introduction**

The National Aeronautics and Space Administration (NASA) Office of Education is releasing an Announcement of Opportunity for Cooperative Agreements Notice CAN proposal for NASA related K-12 content focused on high school education. The NASA K-12 CAN provides an opportunity for U.S. public secondary school districts to leverage NASA’s content with their expertise in providing and enabling secondary education instruction. The priority for NASA Education under this CAN is to target secondary education. Each funded proposal is expected to take advantage of NASA’s unique science and exploration missions and contributions in science, technology, engineering, and mathematics (STEM) (science, technology, engineering, and mathematics) areas.

The proposed work is intended to implement strategies that provide models to strengthen educator skills in teaching STEM content involving innovative and hands-on opportunities for learners. It would also increase teachers’ knowledge of NASA-related STEM content. The intended outcomes are to create linkages to and from secondary and higher education, increase student interest in NASA-related science, improve educator capacity to engage students & improve student learning, and ensure diversity and inclusiveness in program activities.

**Proposal Summary**

The proposed project will provide targeted professional development and a research experience for two cohorts of secondary math and science teachers from the Guilford County Schools Central Region. Project activities encompass innovative strategies to strengthen educator skills in teaching hands-on NASA-related STEM content. In collaboration with NC Agricultural and Technical State University faculty and graduate students, teachers will engage in Earth System Science research and design innovative inquiry-based Earth Science teaching modules that are aligned with the North Carolina K-12 Curriculum and that solicit high levels of student interest and engagement.

There are four objectives for the proposed project. First, the proposed project activities will provide experiences and training that improves educators’ abilities to engage their students and enhance student learning. Second, the proposed project activities will increase educator’s capacity to teach STEM content. Third, the proposed project activities will help teachers to develop and implement projects, activities, modules and approaches that benefit high school and middle school learners. Fourth, the proposed project activities will improve educators’ access to and comfort level in using NASA-related STEM materials.

The proposed project activities are designed for sustained implementation over a two year period. Teachers will be selected to participate in two cohorts. Cohort A includes 20 high school math and science teachers and Cohort B includes 20 middle school math and science teachers. The project has four distinct phases:

**Year One**

- **Phase One** Summer University Research & Module Development Experience I
- **Phase Two** Academic Year Coaching and Support I

**Year Two**

- **Phase Three** Summer University Research & Module Development Experience II
• Phase Four   Academic Year Coaching and Support II

In Phase One, Cohort A, high school participants, will engage in an intensive summer university experience. While participating in classroom and laboratory-based experiences, they and will be exposed to cutting-edge research in NASA-Related Earth System Science. This will help the teachers to teach global environmental change and its implications. In collaboration with university faculty, graduate students and a professional development team of master teachers, Cohort A will systematically develop NASA-related STEM K-12 teaching modules for secondary students. The summer experience will end with a symposium in which participants will present their research findings. Cohort A will extend their learning during Phase Two. They will implement their newly developed teaching modules at their home schools with direct support from the professional development team. This support will include co-teaching, observation, and conferencing. University engineering and education graduate students will provide additional support by serving as classroom assistants. Cohort A participants will have the opportunity to reflect on their work by attending quarterly teaching and learning seminar.

In Phase Three and Four, Cohort B middle school and high school teachers will mirror most of the activities of high school teachers in Cohort A. The only exception is that each Cohort B participants will be paired with Cohort A teachers. During all four phases, teachers, university faculty, graduate students, will participate in an online learning community in order to share ideas and module related products. The online learning community will serve as a vehicle to share materials with the broader community.

The major implications of this proposed project is that it is designed to impact teacher effectiveness and student learning in Guilford County Central Region secondary schools. First, it will make use of NASA’s unique science and exploration missions by exposing math & science teachers to cutting-edge NASA-related research in Earth System Environmental Science. Second, the proposed project will increase teachers’ ability to deliver NASA-related STEM instruction through the development and implementation of inquiry-based teaching modules at their home schools. Third, the project will increase student learning and engagement by involving them in innovative NASA-related activities that exposes them content and careers related to Earth System Environmental Science. Finally, with the growing need to understand global warming and climate change, this project will help increase public awareness of this issue.
## Proposal Activities

<table>
<thead>
<tr>
<th>ACTIVITY NAME</th>
<th>ACTIVITY DESCRIPTION</th>
<th>TIMELINE</th>
<th>TARGET GROUP</th>
<th>FACILITATORS</th>
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<tbody>
<tr>
<td><strong>YEAR ONE</strong></td>
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| Summer University Research & Module Development Experience I                  | A four week university experience in which high school teachers will  
  - Engage in NASA-Related Earth Science Research in collaboration with University Faculty & Graduate Students  
  - Develop NASA-related teaching modules that are aligned with school and district standards and the NC Standard Course of Study.  
  - Obtain all instructional materials & supplies necessary to implement teaching modules at home schools  
  - Receive $250 per day for participation                                           | June-July 2010    | Cohort A- High School Teachers  
  - GCS Central Region High Schools  
  - 10 Math  
  - 10 Science  
  - Teaches 70% of Teaching Load                                                   | Professional Development Team-SOE  
  University Faculty  
  University Graduate Students-SOE and NOAA-ISSET Center |
| Academic Year On-Site Coaching and Support I                                  | Sustained support for high school teachers as they implement NASA-related teaching modules. Support includes:  
  - **On-Site Coaching** to support teachers as they implement teaching modules  
  - **Classroom Assistance** provided by NC A&T Graduate Students 1-2 days per week  
  - **Quarterly Meetings** to provide teachers an opportunity to discuss the strengths & weaknesses of teaching modules and make needed changes. Teachers will receive $100 per meeting. | August - May 2010-11 | Cohort A- High School Teachers  
  - GCS Central Region High Schools  
  - 10 Math  
  - 10 Science  
  - Teaches 70% of Teaching Load                                                   | Professional Development Team-SOE  
  University Faculty  
  University Graduate Students-SOE and NOAA-ISSET Center |
| **YEAR TWO**                                                                 |                                                                                                                                                                                                                        |                   |                                                                                                        |                                                                                                |
| Summer University Research & Module Development Experience II                  | A four week university experience in which middle school and high schools teachers will pair with Cohort A to  
  - Engage in NASA-Related Earth Science Research in collaboration with University Faculty & Graduate Students  
  - Develop NASA-related teaching modules that are aligned with school and district standards and the NC Standard Course of Study.  
  - Receive all instructional materials & supplies necessary to implement teaching modules  
  - Receive $250 per day for participation                                           | June-July 2011    | Cohort B- Middle School & High School Teachers  
  - GCS Central Region Middle Schools  
  - 5 middle school math  
  - 5 middle school science  
  - 5 high school math  
  - 5 high school science  
  - Teaches 70% of teaching load                                                   | Professional Development Team-SOE  
  Cohort A Teachers  
  University Faculty  
  University Graduate Students-SOE and NOAA-ISSET Center |
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<tr>
<th>Academic Year</th>
<th>On-Site Coaching and Support</th>
<th>August- May 2011-12</th>
<th>Professional Development Team- SOE</th>
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<tr>
<td><strong>On-Site Coaching</strong></td>
<td>Sustained support for middle school teachers as they implement NASA-related teaching modules. Support includes:</td>
<td><strong>Cohort B- Middle School Teachers</strong></td>
<td>Cohort A Teachers</td>
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<td><strong>Classroom Assistance</strong></td>
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