

NASA Science and Technology Institute for Minority Institutions (NSTI-MI)

Brenda J. Collins, Project Manager
Natalie Gore, Deputy Project Manager
NASA Ames Research Center, Moffett Field, CA
650-604-3540

PROJECT DESCRIPTION

The NASA Science and Technology Institute for Minority Institutions (NSTI-MI) was established in 2006 to provide leading-edge research opportunities for faculty and students from MIs that complement NASA's research programs and make original contributions to NASA in astrobiology, biotechnology, information technology, emerging technologies, energy, environment research. The NSTI-MI brings together the talent and expertise of MIs to communicate, connect, and collaborate with government, the private sector, one another, and other majority institutions and research and technical associations through the establishment of R&D collaborations and partnerships. By placing MIs within this nexus of business, industry and economic and transfer networks, NSTI-MI aims to: stimulate cross-disciplinary research; improve the transfer of information ideas and technology; promote the development of market-based technologies; foster technology management strategies that will move advances from scientific discovery to basic and applied technology; and establish educational frameworks and networks that will continue to expand the Nation's talent base for research and development.

The Office of Education at ARC developed the concept of the NASA Science and Technology Institute for Minority Institutions (NSTI-MI) in response to the Center's development of the NASA Research Park (NRP). ARC's Office of Education believed strongly that the Minority Serving Institutions should be provided an opportunity for their faculty and students to conduct research with the NASA scientists and engineer, students and faculty from other NRP partner institutions, and Silicon Valley companies.

The NRP, located at NASA Ames Research Center in Silicon Valley, is a world-class, shared-use research and education campus for government, academia, non-profits and industry in support of NASA's

mission. The NRP has over 40 companies and 12 universities collaborating onsite with NASA on education and a variety of research disciplines including information technology, nanotechnology, life sciences, biotechnology, space technology and space entrepreneurship.

In calendar year 2008, the NSTI-MI project was expanded into an Office of Education national project with new research clusters placed at Glenn Research Center, Johnson Space Center.

The NSTI-MI is currently administered by the United Negro College Fund Special Programs Corporation (UNCFSP) through a cooperative agreement and managed by ARC's Office of Education.

PROJECT GOALS

The purpose of the NSTI-MI is to provide support for minority institutions and to enable advancement of scientific research among their faculty and students. NSTI-MI will merge scientific discovery with the skill-sets traditionally located in the business disciplines. NSTI-MI will accomplish its goals through the formation of research clusters that include faculty, student and postdoctoral fellows and will collaborate with NASA scientist/engineers, other majority institutions and the private sector to engage in NASA-related research and development. NSTI is committed to developing fellows and employees for leadership positions. NSTI-MI research clusters provide excellent leadership opportunity for faculty from MI to lead research teams and assist member institutions in competing for new research grants and/or contracts. NSTI-MI will provide professional development training in R&D leadership and development, project management, business development, marketing and contract management. NSTI-MI is committed to STEM workforce development. It provides internship; fellowship and mentoring opportunities for undergraduate and graduate students in NASA related programs and activities.

All NSTI-MI goals and objectives are designed to support the Agency Strategic Plan and Education goals. For instance, NSTI-MI will support one or more objectives under Education Outcomes 1, 2, and 3.

NSTI-MI will focus its efforts to meet the goals and objectives listed below. The parenthesis that follows each goal is a cross-reference to the appropriate Higher Education objective.

Goal 1: Link Minority institutions, industry, non-profits, and other entities through close association and alignment of research interests and expertise to create symbiotic partnerships.

Goal 2: Channel R&D efforts toward the development of market-based concepts that can be leveraged for sustainability.

Goal 3: Provide professional development, including research, business acumen, and leadership building expertise that will groom and prepare faculty, students, and others to be highly-skilled science and technology leaders and managers.

- Goal 4: Work with Key Stakeholders to perform the following
- Select students through a competitive application process to increase their STEM awareness and knowledge through individual experiential opportunities,
 - Select faculty at minority institutions through competitive application processes to engage in collaborative research and increase their awareness and knowledge of NASA disciplines and missions, and
 - Select minority-serving institutions participating in the NSTI Cluster project through competitive application processes to increase their research capability and capacity for competitiveness for mainstream research and development awards.

PROJECT BENEFIT TO OUTCOME 1

Goal: Strengthen NASA and the Nation's future workforce

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's Strategic goals, through a portfolio of investments.

Objective 1.1 Faculty and Research Support

Provide NASA competency-based education and Research opportunities for faculty, researchers and post-doctoral Fellows.

Objective 1.2 Student Support

Provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in

STEM disciplines at NASA, industry or higher education.

Objective 1.3 Student Involvement

Provide opportunities for groups of post-secondary students to engage in authentic NASA-related mission-based research and development activities.

Objective 1.4 Course Development

Develop NASA-related course resources for integration into STEM disciplines.

Objective 1.5 Targeted Institution Research and Academic Infrastructure

Improve the ability of target institutions to compete for NASA research and development work.

PROJECT ACCOMPLISHMENTS

The goal for NSTI this fiscal year was to provide professional development, including research, business acumen, and leadership building expertise that will groom and prepare faculty, students, and others to be highly-skilled science and technology leaders and managers.

Several measurable outcomes were accomplished in 2009:

- In 2009 NSTI sponsored 15 undergraduate students through its Summer Scholars program.
- The NSTI Summer Scholar program expanded to two additional NASA centers (Johnson and Glenn) in 2009.
- 2 of 15 of the 2009 cohort had their internships extended beyond the 10-week experience.

- Students from the 2009 cohort effectively used the contacts created at NASA to network in their fields with professors located at other institutions.
- NSTI provided professional training to the interns via a web-based program that in the future could be made available to all NASA summer interns.
- NSTI successfully implemented a new component, the Faculty Fellowship Program in 2009. Seven Fellows were selected from minority institutions and spent 10 weeks at ARC collaborating with NASA scientists.
- The faculty fellows were provided with professional development training in the areas of connecting research to the classroom, obtaining government grants and contracts, and retaining under-represented and underserved students in STEM disciplines.
- One of the seven fellows extended his fellowship beyond the 10 weeks to continue to his fruitful collaboration with his NASA host scientist.
- NSTI sponsored the first annual NSTI Faculty Fellowship Symposium in which all of the faculty fellows gave presentations and answered questions about their summer research experience at NASA.
- NSTI Faculty Fellows participated in the annual summer poster session at Ames.
- UNCFSP established the NSTI Research Trust to administer the NSTI Research Cluster portion of the program. Each NSTI Cluster University is a member of the Trust.
- All NSTI Clusters reported successes from the NASA supported research being done at the cluster universities. Examples of these successes are below:
 - **UNCFSP-NSTI Mission Enabling Technologies Cluster (UNIMET)** This cluster reported that three Stem courses are being offered at cluster institutions with NASA content

in the areas of Biomedical Bioinformatics and Environmental Toxicology. This cluster also reported that one institution made progress in outlining a way to successfully circumvent problems associated with the chemical synthesis of DNA.

- **UNCFSP-NSTI Information and Emerging Technologies Cluster (UNITE)** – This cluster reported that two STEM courses at the participating minority institutions have been revised to include NASA-related subject areas within Information Technology and System Analysis. In addition this cluster reported that one institution achieved its research goals for the “Secured Networks for Space-Based Exploration” project. This project allows the monitoring of live streaming traffic instead of storing the incoming data in the memory before processing.
- **UNCFSP-NSTI Energy and Environmental Cluster (UNEEC)** – This cluster was pleased to report that a total of four STEM courses (3 new, 1 revised) are being offered at cluster institutions with NASA content in the areas of Marine Science, Engineering Technology and Innovation. One institution achieved a successful milestone with a discovery that will significantly reduce the cost of producing bio-fuels from algae.

PROJECT CONTRIBUTIONS TO PART MEASURES

Summer Faculty Fellowship Program

Total number of Participants FY 09 (Cohort 1): 7

Objective 1.1: Faculty and Research Support: 7

Summer Scholars Program

Total number participants reported FY09 (Cohorts 4): 15

Number of participants continuing in school: 14

Objective 1.2: Underserved and underrepresented student participation: 15

Category	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Participants	21	10	13	15
Male	11	4	4	7
Female	10	6	9	8
Graduate	5	2	6	0
Undergraduate	16	8	7	15
Minority Institution	14	7	4	13
Majority Institution	7	3	9	2
Prior NASA	0	1	3	2

Gender	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Grand Total
Female	10	6	9	7	32
Male	11	4	4	8	27
Grand Total	21	10	13	15	59

Race/Ethnicity	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Grand Total
African American	14	5	5	15	39
Caucasian	2	2	3	0	7
Hispanic	4	2	4	0	10
Other	1	1	1	0	3
Grand Total	21	10	13	15	59

Type Institution	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Grand Total
HBCU	12	4	2	13	31
HSI	2	3	2	0	7
Majority	7	3	9	2	21
Grand Total	21	10	13	15	59

NSTI Cluster

Total number of Clusters: 3

Total minority institutions participating: 11

Total number of NASA centers participating: 3

Objective 1.3 Student Involvement

Number of Students conducting NASA related research at cluster universities FY09: 36

Objective 1.4 Course Development

Number of updated or new STEM courses with NASA related content provided at cluster universities FY 09: 9

IMPROVEMENTS

1. Based on recommendations from previous participants, NSTI Summer Scholars Program (SSP) developed and implemented a calendar of events. The calendar was distributed to all scholars during the orientation session.
2. Recruitment for the 2009 SSP was targeted to schools within the NSTI clusters. This enhanced our efforts to increase the number of underrepresented students from minority institutions in the SSP. In 2009 eighty-seven percent (87%) of the students were from minority institutions as compared to thirty-one percent (31%) the prior year.
3. In 2009 the students were sent to three different centers: Johnson, Glenn, and Ames. The 2009 SSP applicants were recruited based on the specific core competencies needed for the host cluster. All students performed their training at the NASA center that hosted the cluster activities.
4. Graduate students were not recruited for the 2009 SSP.

5. The SSP training curriculum included three courses: financial management for career success, getting into the graduate school of your choice, and skills on promoting yourself to future employers. For the first time these courses were offered to students via an Internet portal that allowed the students to view the presentations from their remote locations.
6. The NSTI Summer Faculty Fellowships (FFP) was introduced to the NSTI Project in Year 3 (FY09). The FFP targeted early stage tenure track Faculty members from STEM departments at Minority Institutions. Seven FFP fellows were selected for this 10-week fellowship. The fellows were all located at Ames Research Center. Six of the seven fellows were from minority institutions.
7. NSTI hired an Academic Manager who assisted with the overall management of the project. The manager designed and launched the Summer Faculty Fellowship Program in October 2008, and oversaw the expansion of the Summer Scholars program to two additional NASA centers.
8. NSTI held successful meetings in September 2009 with the cluster teams from NASA Glenn, Johnson and Ames in Arlington Virginia.
 - Two of the meetings were held at the NASA centers and provided the NASA cluster members an opportunity to question the university scientist. Those who attended the Glenn meeting were also offered SPIA training. The Summer Scholars located at Glenn were presented at this meeting.
 - The third meeting was held at in Arlington Virginia. The purpose of the meeting was to discuss relevant issues related to the progress of the NSTI Research Clusters. Item discussed included: Communication, Graduate Student and Post Doctoral Student Funding, Funding of Laboratory Technicians to work at the University, Budgets, Intellectual Property/Patents, and the NSTI Research Trust.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

In the third funding year of the NSTI project, three NSTI Research Clusters were fully established. The UNITE, UNEEC and UNIMET clusters each specialized in research disciplines that will help to make the Vision for Space Exploration a reality to promote the advancement of space exploration. Each cluster is defined as:

UNCFSP-NSTI Information and Emerging Technologies Cluster (UNITE) conducts research that addresses pressing challenges in the areas of Supercomputing, Networking and Intelligent Systems. This Cluster also engages in nano-scale research to support Aerospace and Thermal Protection Systems as well human exploration of space. UNITE institutions are listed below:

Information and Emerging Technologies Trust (UNITE)-Ames
San Francisco State University
Texas Southern University
California State University- Fullerton
Southern University
Tuskegee University

UNCFSP-NSTI Mission Enabling Technologies Cluster (UNIMET) will conduct human exploration mission enabling research in the areas of Science Missions and Payloads, Biotechnology, Astrobiology, Human Factors, Advanced Life Support and Bio-nano-info fusion. UNIMET Institutions are listed below:

Mission Enabling Technologies Trust (UNIMET) -Johnson
Jackson State University
Texas Southern University
Savannah State University
Jarvis Christian College
Tougaloo College

UNCFSP-NSTI Energy and Environmental Cluster (UNEEC) will address energy and environmental issues as it relates to space travel and life on earth. UNEEC institutions are listed below:

<u>Energy and Environmental Trust (UNEEC) -Glenn</u>
Savannah State University
University of Texas at El Paso
Wilberforce University
Texas Southern University