

**MASTER PLAN
FOR DIVERSITY PROGRAMMING TO ACHIEVE INCREASED DOCTORAL
DEGREE PRODUCTION IN SCIENCE AND ENGINEERING AND THE
PROFESSORiate FOR UNDERREPRESENTED MINORITIES
DECEMBER 3, 1998**

INTRODUCTION

On November 16-17, 1998, a call for a Summit Conference on diversity programming was sponsored by the Directorate for Education and Human Resources (EHR) of the National Science Foundation (NSF). In attendance were project directors and administrators from awardee institutions for the following programs that form a continuum for enhancing diversity in doctoral production and the professoriate: the Louis Stokes Alliances for Minority Participation (LSAMP); HBCU Undergraduate Initiative; Minority Graduate Education (MGE); and Centers of Research Excellence for Science and Technology (CREST). Two of the programs, LSAMP and the HBCU Undergraduate Initiative focus on the undergraduate level, while the MGE and CREST programs focus on the graduate level, including the science and engineering professoriate. These four programs are described elsewhere in this document.

The summit conference addressed four areas of importance: (1) Orientation of project directors for the newly established MGE and HBCU Undergraduate programs. This session provided an opportunity for each of the new participants to meet each other prior to presentations on the managerial procedures for meeting NSF requirements and the concomitant measurable goals and objectives that will form the basis of annual reports and Program Effectiveness Reviews (PERs); (2) PER sessions for LSAMP and CREST programs. These sessions focused on progress of selected projects that clearly demonstrate what is needed to have a successful enterprise based on the production of baccalaureate and doctoral degrees in science, mathematics, engineering, and technology (SMET) fields; (3) A session focusing on Bridging Strategies for the Graduate/Undergraduate Transition examined the issues of how undergraduate institutions can enhance collaborations with graduate institutions to assure transition of more underrepresented minority students into graduate study in SMET disciplines; and (4) An Executive Panel was assembled to discuss the national view of how this nation can increase diversity in the SMET professoriate. The summit conference served as a foundation for explicating plans and strategies that will help NSF successfully implement the continuum of programs that focus on diversity in the professoriate. Summaries of these conference sessions follow below. Following the conference, each of the programs has prepared a management plan that emphasizes substantive collaborations between the four program initiatives.

- The Panel Review of the Annual Reports and decisions on continued funding will be June 19, 1999.
- In collaboration with the Engineering Directorate and others, funds connecting programs at CREST Centers and other NSF research centers of excellence will be awarded.
- Performance site visits will be made to each funded CREST center this fiscal year. These visits will be made in conjunction, when possible, with SUMMIT Meetings to emphasize the interplay between the Louis Stokes Alliance for Minority Participation Program (LSAMP), CREST, Collaboratives for Integrating Research and Education (CIRE), Minority Graduate Education Program (MGE), the Historically Black College and University Initiative (HBCU), and the Integration of Graduate Education and Research Training (IGERT).
- The schedule for site visits is as follows:
 - January 11-12 : Hampton University and Norfolk State University
 - February 9 : North Carolina A&T State University
 - February 11-12: Tennessee State University and Summit with TSU, Vanderbilt, Meharry University, Fisk University, and others.
 - February 17 : Tuskegee University
 - February 18-19: Clark-Atlanta University and Summit with CAU, Morehouse, Georgia Tech, Georgia State U., and others
 - March 11-12 : California State University, LA and Summit with CSLA, UC Santa Barbara, UCLA, UC Riverside, UC Irvine, and Others.
 - April 12-15 : Florida A&M University/Florida International University and Summit at the National High Field Magnetic Laboratory for FAMU/FIU, Florida State U., U. Florida, and others.
 - September 17 : Jackson State University

During the site visits, CREST centers will be encouraged to establish awareness and permanence for CREST on campus. Examples: (1) Sign or logo identifying CREST center or CREST center office; (2) CREST center brochures in Admissions Office, SMET departmental offices, and SMET deans offices; (3) Copies of the annual report in the libraries, president's office, academic vice president's office, SMET dean's office, and SMET departmental offices; (4) "Open House" programs for continuing CREST centers. New CREST centers will be encouraged to hold official openings and dedication activities. Where possible, feasible and practical, CREST centers will be encouraged to establish relationships with LSAMPs, MGEs, ERCs, STCs, and other CREST centers.

CREST project directors will publish a report documenting the outstanding research and education provided by the NSF-funded CREST centers. The purpose of the report will be (1) to recognize the production and achievements of the CREST centers, (2) to document the development of research capability at the CREST institutions, (3) to highlight the education and research contributions of the CREST centers, (4) to share best practices; (5) to provide a guide for potential CREST centers; and (6) to serve as a CREST information resource reference.

Three CREST centers, Center for Theoretical Studies of Physical Systems at Clark-Atlanta University, Nuclear High Energy Physics Research Center of Excellence at Hampton University, and the Center for Distributed Computing at Florida A&M University participated in the Program Effectiveness Review (PER) and Diversity Programming Summit held at the Arlington Hilton on

DIVERSITY SUMMIT FINDINGS

A. ORIENTATION SESSION FOR PROJECT DIRECTORS OF THE MGE AND HBCU PROGRAMS

This orientation session provided an opportunity for the principal investigators from the MGE and HBCU programs to meet with each other for the first time. It was important that these two groups get to know each other and thus help to facilitate the enrollment of minority SMET graduates from the HBCU institutions into doctoral programs at MGE institutions. The primary goals of the MGE program is to significantly increase the number of African American, Hispanic, and Native American students receiving doctoral degrees in SEM and to increase the number of minorities who enter the professoriate in SEM. The eight institutions receiving awards in FY 1998 were: University of Florida, University of Michigan, University of Puerto Rico, Howard University, Rice University, Georgia Tech, University of Missouri and the University of Alabama, Birmingham. During the orientation session some of the data that will be collected yearly by each MGE project were presented and are shown below:

MINIMUM MGE BASELINE DATA

1. SEM Ph.D. Enrollments: by discipline/year/ethnicity and gender
2. Percentage of SEM Ph.D. students retained: by discipline/year/ethnicity and gender
3. SEM Ph.D. Graduates: by discipline/year/ethnicity and gender

Diversity of Professoriate

1. SEM Faculty : by discipline/ethnicity and gender
2. SEM Tenure tract positions filled: by department/year/ethnicity and gender
3. SEM Ph.D. graduates entering the professoriate by: discipline/year/ethnicity and gender

The overall success of the MGE program will be measured, to a large extent, by these six factors. The NSF expectation that the MGE projects will triple the number of minority Ph.D. graduates over the five year duration of their projects seemed to create some degree of apprehension among the principal investigators. The eight MGE institutions collectively are currently producing an average of 55 minority Ph.D. graduates a year in SMET, which represents approximately nine percent of the total production from all U.S. institutions.

The goal of the HBCU initiative is to strengthened the SMET education and research infrastructure and thereby increase the number and quality of minority B.S. graduates from these targeted institutions. This is to be done by providing support for the development and maintenance of a diverse and intellectually vigorous faculty, strengthening curricula and providing research experiences for undergraduates, and some scientific instrumentation. The three institutions receiving awards were: Morehouse College, Morgan State University and Southern University, Baton Rouge. The data that are to be collected yearly by these awardees include the following:

November 16-17, 1998. During the PER, the directors of the three centers made presentations highlighting progress and accomplishments in the following areas:

1. The Center's Impact on Minority Graduate Degree Production
(Status of SMET PhD Program, SMET PhDs Produced, Projections over the next 5 years, MOUs with PhD Granting Institutions, Students Pursuing Graduate Degrees at other Institutions, Tracking System)
2. Integration of Education and Research
(User Facilities, Research Experiences for Undergraduates, Etc.)
3. Minority SMET Faculty
(Number, Research Experience, Productivity, Tenure Status, Etc.)
4. Linkages
(Alliances/Collaborations with other NSF Centers, Governmental Laboratories, Industry Laboratories, Etc.)
5. Cost-Sharing and Sources of Other Funding
(Leverages Using NASA, DOE, Etc.)
6. Strategic Plan for Self-Sustainability after CREST

Program effectiveness in these areas will continue to

B. MGE PROGRAM

Background:

The Minority Graduate Education (MGE) program began in FY 1998 as a response to a \$5 million appropriation provided by Congress. Eight institutional awards and one research award were made in FY 1998. The awards focus on strategies for changing institutional, departmental, and organizational culture, and on practices that will result in significant increases in minority recruitment, retention, degree conferral and career (especially academic) entry in SMET fields. In FY 1999, Congress noted that the MGE program should become a continuing activity and appropriated an additional \$7.5 million for a total MGE budget of \$12.5 million.

PROGRAM DESCRIPTION

The MGE program primary goal is to significantly increase the number of African American, Hispanic, and native American students who received doctoral degrees in the natural sciences, engineering and mathematics. (SEM). In addition, the program seeks to increase the number of minorities who will enter the professoriate in these disciplines.

Specific Activities With Dates

The following outline gives the overall plan with dates, for managing the MGE program in FY 1999:

1. MGE PI Orientation and Diversity Summit (November 16-17, 1998)
2. Revision of the MGE program announcement (November, 1998)
3. Program Outreach Efforts (December – February, 1999)
4. Program Director's Meeting to Further Development Baseline Criteria (February 8, 1999)
5. Deadline for New Proposals (March 15, 1999)

6. Site Visits to Selected Campuses to Meet with PDs and SEM Department Chairs (February, March, 1999)
7. Panel Meeting to Review New Proposals (April 19-20, 1999)
8. Annual Reports Due (April 15, 1999)
9. Declinations Completed (May 15, 1999)
10. Continuing Increments Completed (May 15, 1999)
11. New Awards Completed (June 15, 1999)
12. DGA Deadline for New Cooperative Agreements (July 31, 1998)
13. Announcement of New MGE Awards (August, 1999)
14. MGE PDs and S&E Faculty Interact with LSAMP Students at LSAMP Meeting in Mississippi (August 1-3, 1999)
15. Revised MGE Guidelines (August 31, 1999)

Capability Assessment: It is anticipated that approximately 75-100 MGE proposals will be received in FY 1999 and that 10-12 awards will be made as Cooperative Agreements. The FY 1999 MGE operating budget is approximately \$12.5 million, of which \$4 million is mortgaged for continuing awards and the remainder for new awards. In addition, three LSAMP supplemental awards, which were reviewed in FY 1998, of approximately \$75,000 each will be made from FY 1999 MGE funds.

Impact Monitoring Plan: On February 8, 1999, MGE project directors will meet at NSF to finalize the specific quantitative data that are to be collected yearly, by each project. In addition, each project will be required to submit an Annual Report which will include both quantitative and qualitative information on the projects. The FY 1999 Annual Report will be due April 15, 1999.

INSIGHT FROM THE SUMMIT MEETING
November 16-17, 1998
CREST Program

GOAL: The goal of the Centers for Research Excellence in Science and Technology (CREST) program is to provide the research infrastructure, outstanding faculty, and atmosphere at institutions with predominately minority enrollments that will result in a doubling within five years of the annual number of well qualified underrepresented minority students receiving the Ph.D. degree.

STRATEGY: Through competitive grants and agreements fund those institutions that have a vision and a human resource base that will enable them to increase the research infrastructure, the number and quality of faculty role models, and the time

for faculty involvement with students that will result in the development of excellent, well-prepared Ph.D. graduates. Implementing this plan will require an emphasis on cutting-edge research, a desire to develop human capital, integrating the research and education experience, promoting partnerships with other outstanding research centers, and coordinating the CREST program with other NSF funded activities in this area—The Minority Graduate Education (MGE) program, the HBCU program, and the Alliance for Minority Participation (AMP) program in particular.

FINDINGS: While the emphasis on increasing underrepresented minority Ph.D. degree graduates must be maintained and enhanced, progress has been made:

- Research infrastructure and funding at CREST institutions has increased at a rate over twice the National average of 7%/year.
- CREST Centers have received National and International attention, acclaim and awards for research work.
- All CREST institutions, as of 1997, have Ph.D. programs or agreements with partner schools that lead to the opportunity for students to receive the Ph.D. while working at the CREST school.
- CREST institutions awarded in 1997 24% of all minority M.S. degrees and 11% of all minority Ph.D. degrees in science and engineering. This will increase now that every school has a Ph.D. program or an agreement that allows immediate access to a Ph.D. program.

BARRIERS: While progress has been made, several barriers to continued and increased success exist. The November 16-17 Summit Meeting at NSF discussed the following barriers as particularly important:

- **Lack of Articulation Agreements and Admission Policies---** Universities must meet the needs of a range of students by providing consistent admission policies, and credit for courses taken at other schools.
- **Lack of Preparation---** developing 'red shirt' courses which would help students with poorly prepared backgrounds, and by a continual review of 'gatekeeper' courses and the faculty that teach them.
- **No Well Charted Path Between Grades 11-17---** Partnerships must be built and encouraged between highschools, community colleges and higher education for grades 11-17.
- **A Lack of Student Self Confidence for Graduate Programs---** Stronger student preparation and opportunities to build self esteem through research experiences for undergraduates and comparable teaching or mentoring experience for undergraduates.
- **Insufficient Knowledge On Why Students Do Not Take Graduate Work---** Research, including baseline data, on why students decided to enroll for advanced degrees and why some fail to complete the journey.

- **Poor Coordination Between Institutions and NSF Funded Programs---Knowledge and commitment at the highest level of the Universities to making a barrier free path to graduate education, and strong interaction between NSF programs such as AMP, HBCU, CREST, and MGE.**

RECOMMENDATIONS:

- **CREST institutions must work harder on attracting minority faculty role models who will provide an effective work environment for minority students working on the Ph.D.**
- **Partnerships must be increased and strengthened.**
- **The student pipeline (cooperation and collaboration with AMP, HBCU, and MGE programs) must be strengthened**
- **CREST and MGE institutions must work harder on attracting minority faculty role models who will provide an effective work environment for minority students working on the Ph.D.**
- **The institution Chief Executive Officers must strongly support this program, and be committed to the education and graduation of minority Ph.D.'s who will take their place in academe and industry.**

4. SEM Ph.D. graduates entering the professoriate by: discipline/year/ethnicity and gender

**Diversity Summit: Diversity in the SMET Professoriate
Executive Panel Recommendations**

- Broaden SMET graduate school admissions requirements to look at a range of parameters and to acknowledge alternative dimensions (e.g. Georgia Tech.)

- Refine faculty reward systems to promote faculty/student mentorship combined with research. Establish endowed chairs for mentoring in order to ratchet-up the faculty incentive structure.
- Identify model institutions committed to reform, recruitment and teaching to develop faculty to mentor students.
- Establish clear (common core) content and performance standards at undergraduate and graduate levels and develop self-study tools in order to facilitate student's achievement of appropriate proficiency.
- Encourage and help students to prepare Individual Educational Plan (IEP) to help them set goals throughout the educational continuum.
- Revise mathematics gate-keeping courses to promote mathematics competency development for all students.
- Institutions should partner and establish transfer, and dual graduation programs, and to allow students to acclimate themselves and/or enter programs that will nurture their abilities to then move on.
- NSF should fund institutions that prepare students to graduate school and that partner with other institutions to provide guaranteed admission.
- Expand cooperative programs with smaller companies (venture capitol) to provide students with appropriate experience.
- Strengthen faculty by inviting industry practitioners as visiting professors.
- Make undergraduate/graduate transition seamless.

Summary:

1. Ensure excellent undergraduate education in order to develop a pool of undergraduate students that can proceed to graduate school;
2. Make the graduate sequence more productive and accommodating;
3. Make clear that post-docs are part of the process.