

Innovations in Engineering Education, Curriculum, and Infrastructure (IEECI)

Program Announcement

NSF 08-542

Replaces Document(s):

PD 05-1340



National Science Foundation

Directorate for Engineering
Engineering Education and Centers

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

April 30, 2008

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Innovations in Engineering Education, Curriculum and Infrastructure (IEECI)

Synopsis of Program:

The Innovations in Engineering Education, Curriculum, and Infrastructure (IEECI) program supports research which addresses three basic issues related to engineering education: (1) how students best learn the ideas, principles, and practices to become creative and innovative engineers, and how this learning is measured; and (2) research that helps the community understand how to better attract a more talented and diverse student body, in particular U.S. citizens and permanent residents, to all levels of engineering study. This would also include research to understand how to increase student interest in engineering by leveraging partnerships among engineering schools, school districts and exemplary non-profit organizations to recruit and retain engineering students. Finally (3), this program will support projects to investigate potential models for the evaluation of and assessment of how successful teaching, advising, and mentoring leads to improved retention and graduation, and ultimately, to a sound business model for engineering education.

Cognizant Program Officer(s):

- Susan C. Kemnitzer, telephone: (703) 292-5347, email: skemnitz@nsf.gov
- Sally Wood, 585N, telephone: (703)292-7107, fax: (703)292-9057, email: slwood@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 40 to 50 Two types of awards will be supported: Exploratory Projects (32-40 grants are anticipated) and Expansion Projects (approximately 8-10 grants are anticipated). The Expansion Projects will only be available for area (1) Innovations in Teaching and Learning. Funding for Exploratory Projects will be available in areas (2) and (3) only.

Anticipated Funding Amount: The total anticipated funding in FY08 for projects associated with this announcement is \$9,000,000. Two types of support will be provided: Exploratory Projects funding up to a total of \$100,000 for 1 year and Expansion Projects funding up to a total of \$500,000 for 2-3 years. Exploratory Projects involving multiple universities, however, can apply for one year grants up to \$150,000.

Eligibility Information

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
 - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=ggg.
 - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>)

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation. 0.00
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

April 30, 2008

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria apply.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

Summary of Program Requirements

- I. **Introduction**
- II. **Program Description**
- III. **Award Information**
- IV. **Eligibility Information**
- V. **Proposal Preparation and Submission Instructions**
 - A. **Proposal Preparation Instructions**
 - B. **Budgetary Information**
 - C. **Due Dates**
 - D. **FastLane/Grants.gov Requirements**
- VI. **NSF Proposal Processing and Review Procedures**
 - A. **NSF Merit Review Criteria**
 - B. **Review and Selection Process**
- VII. **Award Administration Information**
 - A. **Notification of the Award**
 - B. **Award Conditions**
 - C. **Reporting Requirements**
- VIII. **Agency Contacts**
- IX. **Other Information**

I. INTRODUCTION

Engineering education today is facing an unprecedented array of pressures. As a national resource that drives economic growth, the quality of engineering education has a direct impact on our ability as a nation to compete in the increasingly global competitive environment of the 21st century. The globalization of the engineering workforce has shifted the societal framework and, in doing so, requires engineering education today to effectively recruit and support all groups to its ranks. The National Science Board (*Moving Forward to Improve Engineering Education*, 2007), in fact, has emphasized that “engineering education must change in light of changing workforce demographics and needs.” With the emergence of engineering talent in developing countries, there is also pressure to educate engineers whose characteristics justify wage differentials that can be as high as five-fold. Further, the 21st century engineer must be able to deal with a rapid pace of

technological change, a highly interconnected world, and complex problems that require multidisciplinary solutions.

While the past 15 years have witnessed many successful advances in engineering education (for example, more student-centered pedagogies, the integration of research and engineering education), the introduction of design and other engineering concepts and experiences earlier in the curriculum, better understanding of the role of assessment, and new ideas on how to recruit, retain and graduate underrepresented groups (women and minorities). However, these changes have been piecemeal and have not resulted in major systemic change within engineering education. For example, in 1983 about 1.9 percent of all four-year baccalaureate degrees received by women were in engineering. Twenty years later, this percentage not only did not increase, but declined to 1.7 percent. (NSB S&E Indicators 2008, Appendix Table 2-27).

As we wrestle with the issues of how to educate the engineer of the future, there is a need for improving our understanding of what attracts students to engineering, and how these students learn engineering. To assure a versatile, well-trained engineering workforce for the future, efforts must focus on inspiring students to earn engineering degrees. The relationship between the leadership of engineering schools (Deans) and K-12 school districts leadership (Superintendents and Principals), as well as leaders in non-profits, industry, and professional associations and the like focused on the engineering pipeline is a relevant factor in the successful production of engineers with a global focus. Unlike formal and well developed partnerships between engineering schools and industry (through the engineering colleges' Industry Advisory Boards), few partnerships exist between the leadership of the K-12 pipeline and the leadership of engineering schools. Implementation of significant changes in the preparation of potential engineering students could be greatly improved with such new partnerships. (*How People Learn: Bridging Research and Practice*, National Research Council, 2000.)

Lastly, one of the issues often overlooked in the continuing effort to reform engineering education is the understanding that engineering education also is a "business" with revenues and costs. And this issue will undoubtedly become more important as tuition increases and more schools consider decentralized cost structures such as "resource centered management." In general, investment in research is ultimately to provide new, innovative, and cost competitive products and services. Research in engineering education also should lead, ultimately, to improved quality and innovation, possibly measured in improved retention, graduation rates, and the successful career trajectories of engineering graduates.

Much has been written about the need to transform engineering education, but potential proposers are also asked to pay special attention to:

- How People Learn: Bridging Research and Practice, M. Suzanne Donovan, John D. Bransford, and James W. Pellegrino, editors. Committee on Learning Research and Educational Practice Commission on Behavioral and Social Sciences and Education National Research Council, 2000.
- The Engineer of 2020: Visions of Engineering in the New Century, National Academy of Engineering, 2004.
- Innovate America, Council on Competitiveness, 2004.
- Assessing the Capacity of the U.S. Engineering Research Enterprise to Meet the Future Needs of the Nation, National Academy of Engineering, 2005.
- The Journal of Engineering Education, Special Issue: The Art and Science of Engineering Education Research, January 2005.
- Educating the Engineer of 2020: Adapting Engineering Education to the New Century, National Academy of Engineering, 2005.
- Moving Forward to Improve Engineering Education, National Science Foundation National Science Board, 2007.

II. PROGRAM DESCRIPTION

The Division of Engineering Education and Centers seeks proposals in three broad areas:

1. Innovations in Teaching and Learning
2. Strategic Supply-Chain Partnerships for Engineering and Technology Programs
3. Insights into the Business of Engineering Education

Project Areas:

1. Innovations in Teaching and Learning

Projects will be supported that contribute to significant breakthroughs in understanding how students learn engineering so that our undergraduate and graduate programs prepare engineers to meet the needs of the changing economy and society. Specifically, we are interested in research that addresses the following:

- **Engineering Epistemologies:** Research on what constitutes engineering thinking and knowledge within current and future social and economic contexts.
- **Engineering Learning Mechanisms:** Research on engineering learners' developing knowledge and competencies in context, with special interest in evolving areas of nanotechnology, service science, and the intersection of biology and engineering.
- **Engineering Learning Systems:** Research on the instructional culture, institutional infrastructure, and epistemology of engineering educators. Of special interest here is research on effective learning systems for the burgeoning role of distance education.
- **Engineering Diversity and Inclusiveness:** Research on how diverse human talents contribute solutions to the social and global challenges and relevance of the profession.
- **Engineering Entrepreneurship:** Research on, and the development of, entrepreneurial behavior, and how concepts of the engineering entrepreneur are constructed and used in society to inform engineering education practice and learning.

In *How People Learn*, practitioners emphasized the continuing need for dialogue between researchers and the practitioners in the classroom. One important change from the previous program description in this area will be the requirement that research teams submitting proposals to the *Innovations in Teaching and Learning* topic must include at least one tenured engineering faculty with a proven and recognized teaching record. In this manner, the research project will be informed by experienced and successful practitioners, and an early path for dissemination will be designed into the project as well.

2. Strategic Supply-Chain Partnerships for Engineering and Technology Programs

The preparation of pre-college students for engineering fields is not a new concern. Business and government have invested substantial resources in the study and improvement of the K-12 pipeline for some time. The NAS's *Gathering Storm* report and the President's American Competitiveness Initiative both address this pipeline as a critical national resource. In addition, the NSB's *Moving Forward* report encourages consideration of an industry-community-university partnership to inform parents and students about engineering. This pipeline is also a priority for the Division of Engineering Education and Centers. In EEC, all Engineering Research Centers (ERC) have pre-college programs that involve teachers and students in the interdisciplinary activities of these Centers. Since 2000 EEC has also supported the innovative Research Experiences for Teachers (RET) Program. RET annually supports about 500 high school (and middle school) teachers in research collaborations with engineering faculty in colleges near their schools. Participating teachers develop course materials from their immersion in engineering research laboratories to bring relevant and timely research experiences back to their classes, impacting many students. But with an estimated 250,000 math/science teachers nationwide, the RET Program is difficult to scale adequately. The IEECI program seeks to support this pipeline through the creation of strategic and sustainable partnerships and collaboratives between engineering schools and institutions that are either part of or committed to improving and diversifying the K-12 pipeline into engineering and technology. To be strategic, such partnerships should be led by senior leadership from the engineering and technology programs as well as the partnering K-12 institution.

To be sustainable, the partnership should result in an organizational adaptation or change to reflect the values and goals of the partnering institutions. In the long-term, such partnerships should ensure a flow of qualified and diverse students into their engineering and technology programs, since each partner will incorporate this outcome into their own strategic plan and organizational mission. Of particular interest are projects which leverage and effectively scale the resources of these partners. An important outcome in this partnership should be a clear understanding of both opportunities and barriers in this partnership so that replication in other relevant settings can be more easily facilitated. Examples of two potential partnerships are described below; these examples are not exclusive, and we seek other proposals for strategic and sustainable partnerships as well.

- One Exploratory opportunity for new partnerships is the relationship between the leadership of engineering and technology schools (Deans) and K-12 school districts (Superintendents and Principals). Such partnerships could improve guidance and cooperation about pre-engineering curricula, career opportunities for students, K-12 faculty development, and, importantly, provide a stronger image of engineering in local communities.
- Another potential partnership for engineering and technology for Exploratory projects could focus on the many successful non-profit and related programs that promote engineering career opportunities. Such programs involve both curricular and extracurricular activities; and strategic partnerships here could leverage and amplify the effectiveness of all of the partner organizations, and provide a catalyst for ensuring the strength and diversity of the engineering pipeline.

3. Insights into the Business of Engineering Education

A longstanding issue about faculty career paths in academe, especially in engineering, is the right balance between teaching and research. Accomplishments and success in research are rewarded at a significantly higher level than similar success in the classroom. One of the reasons for this is the reality that research accomplishments and their impacts are far easier to measure than successes in the classroom.

One inherent difficulty in promoting the importance of quality in the classroom relates to its measurement and how this measurement relates to the college “business model” of teaching, mentoring, and advising. In terms of teaching, faculty classroom success is measured principally in one of the following ways: 1) student evaluations, 2) peer assessment, and 3) curricula materials. Virtually all engineering schools use such evaluation and assessment procedures. However, these evaluations and assessments are fundamentally different than research assessments. Research metrics focus on dollars and publications which directly impact operating budgets, external visibility, and rankings.

On the other hand, in many engineering schools, if not all, methods to measure the financial classroom success of quality teaching, advising and mentoring, do not exist. But, interestingly, the total revenue engineering schools generate through tuition and related fees, as a whole, is estimated to be significantly larger than the total federal research funding, as a whole, at engineering schools.

A clearer understanding of the relationship between teaching, advising, and mentoring effectiveness with retention/graduation and, in due course, the launch of successful careers of our engineering students is needed. Clearly there must be some relationship as evidenced in the Seymour and Hewitt study (Talking about Leaving: Why Undergraduates Leave the Sciences, *Higher Education*, 1998) which focused on students who “switched” out of engineering; with 98 percent of the “switchers” citing poor teaching by STEM faculty as a reason to leave engineering. In a comprehensive study by Adelman (*Women and Men of the Engineering Path: A Model for Analyses of Undergraduate Careers*, US Department of Education, Washington, DC, 1998), slightly more than 56 percent of all students who began pursuing a BS in engineering completed an engineering degree by age 30. Present estimates place the engineering graduation rate in the low 60 percent range. Clearly, retention and throughput in our engineering schools remains a critical problem.

Exploratory proposals addressing how to better comprehend the impact of quality teaching, learning, advising and mentoring in the “business of engineering” are sought. As noted in *Moving Forward*, measuring this impact remains a significant barrier for innovation. The objective of these Exploratory projects is to develop models to determine whether and how quality in the classroom, effective advising, committed mentoring and other relevant factors are important components in sustainable growth of the enterprise of engineering education, regional economic development and, most importantly, the impact on the careers of our engineering graduates.

Important Project Features

Although projects may vary considerably in the number of components they address, in the number of academic institutions involved, in the number of faculty and students that participate, and in their stage of development, all promising Expansion Projects and Exploratory projects should comprise certain characteristics.

Quality, Relevance, and Impact (Exploratory and Expansion Projects): Projects should address an identified need or opportunity in engineering education, clearly indicate how they will meet this need, and be innovative in their production and use of new materials, processes, and ideas, or in their implementation of tested ones. They should be based on an accurate and comprehensive understanding of the disciplinary field and utilize appropriate technology in all learning environments.

For both *Exploratory and Expansion Projects* that include two or more partners, the proposal should clearly articulate how the partnership will leverage the resources and initiatives beyond that of the individual entities. Moreover, in all cases, the proposal should address the issue of long-term sustainability and how, when executed, the proposal will become a strategic initiative of each organization.

Expected Measurable Outcomes (Exploratory and Expansion Projects): Projects should have goals and objectives that have been translated into a set of expected measurable outcomes that can be monitored using quantitative or qualitative approaches or both. These outcomes should be used to track progress, guide the project, and evaluate its ultimate success.

Project Evaluation (Exploratory and Expansion Projects): All projects should have an evaluation plan

that includes both a strategy for monitoring the project as it evolves to provide feedback to guide these efforts (formative evaluation) and a strategy for evaluating the effectiveness of the project in achieving its goals and for identifying positive and negative findings when the project is completed (summative evaluation). These efforts should be based on the project's specific expected measurable outcomes defined in the proposal and should rely on an appropriate mix of qualitative and quantitative approaches in measuring the outcomes.

Advance Project Planning (Exploratory and Expansion Projects): Subject to the availability of funding, current Exploratory Projects could become the project areas of future Expansion Projects in subsequent Program Announcements. However, funding of an Exploratory Project in a specific area would not be a prerequisite for consideration of an Expansion Project proposal in the area.

Project Reporting (Expansion Projects only): The results of research into Innovation in Teaching and Learning need to be communicated more widely. As such, all Expansion Projects, in addition to annual and final reporting requirements, should plan to make their results available through the NSF-sponsored National STEM Digital Library.

Project Description (Exploratory Projects only): Page limitations within the Project Description may not exceed 10 pages.

III. AWARD INFORMATION

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 40 to 50 Two types of awards will be supported: Exploratory Projects (32-40 grants are anticipated) and Expansion Projects (approximately 8-10 grants are anticipated). The Expansion Projects will only be available for area (1) Innovations in Teaching and Learning. Funding for Exploratory Projects will be available in areas (2) and (3) only.

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IV. ELIGIBILITY INFORMATION

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the [Grant Proposal Guide](#), Chapter I, Section E.

Organization Limit:

None Specified

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Announcement via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program announcement should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program announcement via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (<http://www.nsf.gov/bfa/dias/policy/docs/grantsgovguide.pdf>). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the Grant Proposal Guide provides additional information on collaborative proposals.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

April 30, 2008

D. FastLane/Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program announcement should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as

researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review and Selection Process

Proposals submitted in response to this program announcement will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/general_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF

awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Susan C. Kemnitzer, telephone: (703) 292-5347, email: skemnitz@nsf.gov
- Sally Wood, 585N, telephone: (703)292-7107, fax: (703)292-9057, email: slwood@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, MyNSF (formerly the Custom News Service) is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. MyNSF also is available on NSF's Website at <http://www.nsf.gov/mynsf/>.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **For General Information** (NSF Information Center): (703) 292-5111

- **TDD (for the hearing-impaired):** (703) 292-5090

- **To Order Publications or Forms:**
 - Send an e-mail to: pubs@nsf.gov
 - or telephone: (703) 292-7827

- **To Locate NSF Employees:** (703) 292-5111


PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing

information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
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