

Nanoscale Science and Engineering Education (NSEE)

Program Solicitation

NSF 05-543

Replaces Document NSF 03-044



National Science Foundation

Directorate for Education and Human Resources

Directorate for Biological Sciences

Directorate for Computer and Information Science and Engineering

Directorate for Engineering

Directorate for Geosciences

Office of International Science and Engineering

Directorate for Mathematical and Physical Sciences

Directorate for Social, Behavioral, and Economic Sciences

Letter of Intent Due Date(s) (required):

February 06, 2005

Nanoscale Informal Science Education (NISE) program ONLY. The NUE program does NOT require a Letter of Intent.

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

April 06, 2005

Nanotechnology Undergraduate Education (NUE)

April 06, 2005

Nanoscale Informal Science Education (NISE)

REVISIONS AND UPDATES

This NSEE solicitation provides funding only for the following two program components: Nanoscale Informal Science Education (NISE) and Nanotechnology Undergraduate Education (NUE).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Nanoscale Science and Engineering Education (NSEE)

Synopsis of Program:

This solicitation continues a comprehensive effort on the part of the National Science Foundation (NSF) to enhance formal and informal education in nanoscale science, engineering, and technology. Its goals are to develop strong partnerships linking science educators with nanoscale science and engineering researchers, and to increase knowledge of advances in nanoscale research and technology and their impact on society.

To attain the overarching program goals, NSEE encompasses two independent components:

[A] Nanoscale Informal Science Education (NISE): This effort is intended to foster public awareness, engagement, and understanding of nanoscale science, engineering, and technology through establishment of a Network, a national infrastructure that links science museums and other informal science education organizations with nanoscale science and engineering research organizations.

[B] Nanotechnology Undergraduate Education (NUE): This component aims at introducing nanoscale science, engineering, and technology through a variety of interdisciplinary approaches into undergraduate education, particularly in the first two collegiate years.

A related program solicitation, *Nanoscale Science and Engineering (NSF 04-043)*, is focused on fundamental research in emerging areas of nanoscale science, engineering, and technology. This related solicitation contains three components: *Nanoscale Interdisciplinary Research Teams (NIRT)*; *Nanoscale Exploratory Research (NER)*; and *Nanoscale Science and Engineering Centers (NSEC)*. Other research and education projects in nanoscale science and engineering will continue to be supported in the relevant NSF programs and divisions.

NOTE: Those organizations with an interest in more than one NSEE component must submit separate proposals for each component of interest.

Cognizant Program Officer(s):

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- Charles D. Pibel, for *Nanotechnology Undergraduate Education (NUE)*, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4971, email: cpibel@nsf.gov
- Ronald Rainger, for *Nanotechnology Undergraduate Education (NUE)*, Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7283, email: rrainger@nsf.gov
- Larry H. Weber, Senior Program Officer, Office of the Director, Office of International Science and Engineering, 935 N, telephone: (703) 292-8704, fax: (703) 292-9175, email: lweber@nsf.gov

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

- 47.074 --- Biological Sciences
- 47.070 --- Computer and Information Science and Engineering
- 47.076 --- Education and Human Resources
- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.049 --- Mathematical and Physical Sciences
- 47.075 --- Social, Behavioral and Economic Sciences

Eligibility Information

- **Organization Limit:**

(NISE) See Section III, Eligibility Information, for specific requirements and limits for the lead organization, ISE partner organizations, and research organizations.

(NUE) See Section III, Eligibility Information, for specific requirements and limitations.

- **PI Eligibility Limit:**

(NISE) The PI must be a senior staff member at the lead organization.

(NUE) None specified.

- **Limit on Number of Proposals:** (NISE) An eligible organization may participate in only one proposal, as either a lead and or as a partner organization. (NUE) Only one proposal may be submitted by any institution as the lead institution with the following exception: An institution may submit a second proposal as the lead institution, if it is focused on the societal, ethical, economic and/or environmental implications of nanoscale science and technology; two proposals focused on these areas are not allowed.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement

- **Estimated Number of Awards:** 16

[A] NISE - One five-year award

[B] NUE - Up to 15 awards

- **Anticipated Funding Amount:** \$7,500,000 total funding, per year, pending availability of funds and quality of proposals.

[A] NISE - Up to \$4,500,000 each year for five years

[B] NUE - Up to \$200,000 total for up to two years

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

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

C. Due Dates

- **Letters of Intent (*required*):**
February 06, 2005
Nanoscale Informal Science Education (NISE) program ONLY. The NUE program does NOT require a Letter of Intent.
- **Full Proposal Deadline Date(s)** (due by 5 p.m. proposer's local time):
April 06, 2005
Nanotechnology Undergraduate Education (NUE)
April 06, 2005
Nanoscale Informal Science Education (NISE)

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

- **Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

One nanometer (one billionth of a meter) is a magical point on the dimensional scale. Nanostructures are at the confluence of the smallest of human-made devices and the largest molecules of living systems known today. Nanoscale science and engineering here refer to the fundamental understanding and resulting technological advances arising from the exploitation of new physical, chemical, and biological properties of systems that are intermediate in size, between isolated atoms and molecules and bulk materials, where the transitional properties between the two limits can be controlled. During the last few years, novel structures, phenomena, and processes have been observed at the nanoscale (from a fraction of nanometer to about 100 nm) and new experimental, theoretical and simulation tools have been developed for investigating them. These advances provide exciting opportunities for scientific and technological developments in nanoparticles, nanostructured materials, nanodevices, and systems.

Nanotechnology is the creation and utilization of functional materials, devices, and systems with novel properties and functions that are achieved through the control of matter, atom-by-atom, molecule-by-molecule, or at the macromolecular level. A revolution has begun in science, engineering and technology, based on the ability to organize, characterize, and manipulate matter systematically at the nanoscale. Far-reaching outcomes for the 21st century are envisioned in both scientific knowledge and a wide range of technologies in most industries, healthcare, conservation of materials and energy, biology, environment and education. Fundamental research in Nanoscale Science and Engineering (NSE) underpins innovation in critical areas ranging from manufacturing to medicine.

NSE has technological, economic, environmental, social, and ethical dimensions that may change the world in which we live. Increased understanding and appreciation of the potential for nanoscale science and engineering will be needed to create an informed citizenry and a competitive workforce. It is therefore imperative that our schools and informal science education organizations offer developmentally appropriate and scientifically accurate learning opportunities.

The Nanoscale Science and Engineering Education (NSEE) initiative provides funding for two types of projects that will address the educational challenges of these emerging fields and generate practical ways of introducing nanotechnology to the public at large and into undergraduate education. Specifically, the NISE component will establish a national infrastructure that links science museums and other informal science education organizations with nanoscale science and engineering research organizations. The NUE component will integrate nanoscale science, engineering, and technology into undergraduate curricula, particularly in the first two years. Joining formal and informal education with nanoscale science and engineering research in these ways will create opportunities for new interdisciplinary educational strategies, for understanding and enhancing science literacy, for preparing the 21st century workforce in these fields, and for engaging the interest and broadening the vision of science, engineering, and technology among diverse audiences. Given the worldwide expansion of research and education in nanoscale science and engineering, international collaborations that advance underlying NSEE goals and strengthen U.S. activities are encouraged.

II. PROGRAM DESCRIPTION

This solicitation covers work under two program components: NISE and NUE. Descriptions and review criteria for each component follow.

A. NANOSCALE INFORMAL SCIENCE EDUCATION (NISE) COMPONENT

Program Goals

Created by the convergence of diverse science, technology, engineering, and mathematics (STEM) disciplines at the nanometer scale, the fields of nanoscale science, engineering and technology show promise of tremendous impact. Their applications will affect our daily lives and raise issues of societal importance. National competitiveness will require workers who are interested in pursuing nanotechnology-related careers. As a result, there is a growing need to increase awareness and understanding by citizens of all ages of these emerging research areas, along with their implications.

Informal learning can play a critical role in addressing this need. This type of learning happens throughout our lives in a highly individualized manner based on personal needs, interests, and past experiences. It is voluntary, self-directed, mediated within a social context, and provides an experiential base and motivation for further activity and subsequent learning.

The focus for the NISE program is informal learning applied to nanoscale science, engineering, and technology. The NISE component of the previous Nanoscale Science and Engineering Education (NSEE) solicitation funded exhibition and media development targeted at the general public. In addition, the prior solicitation funded an Instructional Materials Development (NIMD) component and a Center for Learning and Teaching (NCLT). Those awards can be found at <http://www.nsf.gov/home/crssprgm/nano/solicitations.htm>. Principal Investigators (PIs) are encouraged to build on these projects, as well as other related awards separately funded by the NSF Informal Science Education (ISE) program; the complete ISE portfolio can be found at http://www.ehr.nsf.gov/esie/resawrd/awdbypgm_for_esi.cfm.

These efforts all support the core NSF objective of connecting research with education, both formal and informal. Research organizations are content-rich, offering depth of knowledge and resources based in STEM fields, such as nanoscale science, engineering, and technology. Science museums and similar informal science education organizations are audience-rich and closely tied to their communities, with expertise in translating complex topics into forms that engage and educate the public, especially families and children, including K-12 school groups. Thus these organizations can serve as intermediaries that can connect audience needs and interests with knowledge based on current science and technology.

Previous NISE and ISE awards have funded specific projects, such as exhibitions. This solicitation seeks to fund a more comprehensive effort by establishing a national network infrastructure designed to foster public awareness, engagement, and understanding of nanoscale science, engineering, and technology (Network). Planning and implementation of the Network must be based on a strategic assessment of how to engage and educate the public in these areas most effectively. The proposed approaches and associated deliverables should be parts of an integrated overall strategy. To this end, proposals should incorporate significant research and development activities in all aspects of the Network and its creation of public and professional deliverables. In this way, the lead organization and its partners should serve as an "R&D" center for informal nanoscale science, engineering, and technology education.

The goals for the Network are to:

1. Create a sustainable service-oriented infrastructure that supports long-term efforts to educate the public about nanoscale science, engineering, and technology, as well as builds capacity in the field and within participating institutions.
2. Strategically plan, develop, implement, and disseminate educational deliverables of all kinds that foster greater engagement with and understanding of nanoscale science, engineering, and technology in a comprehensive way by the general public, as well as K-12 school groups.
3. Stimulate educational research and evaluation that add to the nanoscale informal science education knowledge base, inform continuous improvement of both products and processes, and guide the development of future deliverables.

To be successful in addressing these goals, the Network must simultaneously embody two types of collaboration. One type, ISE-research organization collaboration, links one or more science museums and

other ISE organizations with NSF-funded research centers in nanoscale science and engineering to create a conduit for connecting informal learning expertise and public audiences with research knowledge. Although firmly grounded in nanoscale science, engineering, and technology appropriate to NISE, this form of collaboration should serve as a model transferable to other STEM fields and should assist researchers in addressing the broader impacts of their work. To the extent possible, it should be informed by and build on existing connections between science museums and research organizations.

The second type of collaboration, ISE organization collaboration, should connect science museums and ISE organizations of varying sizes having complementary capacities and resources. This aspect of the Network should establish an infrastructure that facilitates sharing of knowledge, research and development of deliverables, and engagement with public audiences nationally. Here too, this form of collaboration should build on the lessons learned from prior or current partnerships and should leverage existing resources.

In addition, the Network should seek synergies with K-12 educational efforts in nanoscale science, engineering, and technology. Such connections will further linkages and knowledge transfer between informal and formal efforts, as well as allow the Network to build on existing work and inform the development of new educational resources. International collaborations that advance underlying NISE goals and strengthen U.S. activities are also encouraged.

Issues involved in developing an infrastructure for planning, developing, implementing, and disseminating deliverables designed to engage public audiences in nanoscale research were explored at an NSF meeting on September 2 and 3, 2004. PIs can find the summary of this meeting at <http://www.nsf.gov/nano>. PIs also may benefit from the following monograph, which was generated by a NSF-funded conference of participants from science museums, research institutions, and media organizations: Chittenden, D., Farmelo G., and Lewenstein, B. (2004). *Creating Connections: Museums and Public Understanding of Current Science*, AltaMira Press.

Network Characteristics

Proposals must include Network deliverables as well as individual project deliverables targeted at both public and professional audiences.

PUBLIC AUDIENCES: For self-directed learning based on nanoscale science, engineering, and technology in informal settings.

Audience: The primary target audience must be informal learners, which may include families; children and youth; and adults. Proposed activities must be designed for voluntary, self-directed learning by target audiences. The Network also is encouraged to create linkages with formal education where appropriate, so K-12 students should be included as secondary audiences.

Location: Network activities should be conducted primarily in locations that reach the intended target audiences outside of formal education settings. Examples include museums (e.g., science centers, natural history museums, zoos, aquariums, planetariums, arboretums or botanical gardens, history or art museums); community centers; libraries; theaters, and the home.

Deliverables: Examples of Network deliverables include, but are not limited to, exhibitions or exhibit elements, media products, informal education programs, web-based activities, citizen science projects, science cafés, and other forums. They should address three basic facets of public "research literacy" as applied to nanoscale science, engineering, and technology: understanding the content of current research; the nature or process of research; and potential research implications and consequences. These aspects should not be seen as separate elements, but as interrelated components. Deliverables must be designed in a strategic manner to be synergistic. Ancillary materials, educational resources, and other spin-offs may be deliverables for K-12 education if they support informal learning.

PROFESSIONAL AUDIENCES: For enhancement of informal learning, knowledge, infrastructure, or

systems applied to nanoscale science, engineering, and technology.

ISE Organizations: Professional audiences may be situated at museums (e.g., science center, natural history museum, zoo, aquarium, planetarium, arboretum or botanical garden); community organizations; television and radio stations or networks; national or regional associations; and other organizations or institutions that directly affect informal learning based on nanoscale science, engineering, and technology.

Audience: Targeted individuals may include staff, managers, board members, researchers, evaluators, funders, media producers or disseminators, exhibit designers, or other professionals whose work directly impacts informal nanoscale science, engineering, and technology education. K-12 teachers may be considered secondary professional audiences.

Deliverables: Professional audience deliverables include, but are not limited to, establishment of infrastructure to support the Network; research studies on informal nanoscale science and engineering education; evaluation studies of collaborative aspects of the Network; professional development; or other means for strengthening the Network and its intended outcomes.

In keeping with the desire of the ISE program to achieve the greatest return on its investments, the project funded through this solicitation should "raise the bar" in the field of informal science education. Thus, in making a funding decision, the program will give particular emphasis to the ability of proposals to demonstrate the following characteristics, which are described in greater detail in the ISE program solicitation, available at <http://www.nsf.gov/>

- Strategic Impact: Seek to advance the theory or practice of informal science education through approaches, strategies, findings, or models having lasting impact on the institutions or systems that promote informal learning.
- Innovation: Extend the frontiers of informal science education and "push the envelope" through creative new ways.
- Collaboration: Leverage the respective competencies of partners having complementary resources and expertise to achieve outcomes that otherwise would not be possible.

The Project Description for NISE proposals must be organized into these three major categories as further described in section V. Proposal Preparation and Submission Instructions.

If the scope and estimated cost of the overall project are more extensive than NSF is able to fund under this solicitation, the proposal should include the following information:

- Description of the overall project.
- Detailed description of the scope to be funded by NSF.
- Estimated cost of the overall project, including anticipated sources and amounts of funding other than NSF. The anticipated sources of funding should be identified.
- Detailed budget justification for the scope to be funded by NSF.

Even though cost sharing is no longer required by NSF, reviewers will need this information in order to assess the viability of the overall project as well as the scope and budget to be funded by NSF.

Proposals substantially similar to those being considered under this solicitation cannot be simultaneously submitted to the ISE program; see <http://www.ehr.nsf.gov/esie/programs/ise/ise.asp>. Also see the current ISE solicitation (available at www.nsf.gov) for additional background information, including references.

B. NANOTECHNOLOGY UNDERGRADUATE EDUCATION (NUE) COMPONENT

Program Goals

Advances in nanotechnology research provide new opportunities in undergraduate education. With their focus on imaging and manipulating the atom, the ultimate building block of matter, nanoscale science and engineering provide a multitude of new interdisciplinary teaching opportunities for engaging interest and for broadening vision by students of science, engineering, and technology. Nanoscale science and engineering thus permit new strategies for enhancing science literacy, preparing the workforce for emerging technologies, and attracting a diverse group of talented students to the workforce of tomorrow.

Nanoscale science and engineering provide creative opportunities for invigorating undergraduate education through new courses and research experiences. It blends chemistry, physics, biology, mathematics, computer science, materials science, geology, behavioral and social sciences, and/or engineering. As such, it provides new opportunities for faculty collaboration, both in teaching and in research, that cross traditional disciplinary departmental boundaries. Some examples of nanotechnology-based topics that can be introduced into the curriculum include scanning probe methods, nanotubes, bottom-up and top-down syntheses of nanoscale materials, self-assembly, nanobiotechnology, environmental aspects of nanotechnology, applications of nanotechnology to information technology, properties and fundamental phenomena in nanoscale materials, computational methods for modeling nanoscale materials, nanoscale devices, and the societal, ethical, economic and environmental implications of nanotechnology. See <http://www.nsf.gov/nano> and <http://www.nanofab.psu.edu/education/nsf-nue-program.htm> for additional examples.

NUE projects are intended to enable individuals, departments, programs, or campuses to integrate nanoscale science and engineering into their curricula. Integration could take the form of a new course or courses, or modification of existing courses so that a substantial portion of the course content is based on nanoscale science and engineering. Although proposals involving any part of the undergraduate curriculum are eligible, special emphasis is placed on first- and second-year undergraduate courses, given their pivotal role in influencing science literacy and career paths. International collaborations that advance the underlying NUE goals and strengthen U.S. activities are encouraged.

Project Characteristics

NUE emphasizes new approaches to undergraduate education through interdisciplinary collaborations. These collaborations could lead to, but are not limited to:

- New examples of introductory undergraduate STEM courses that are presented through the development of manuals and other written materials, software, laboratory and demonstration experiments, and web-based resources;
- Development and dissemination of new teaching modules for nanoscale science and engineering that can be used in existing undergraduate STEM courses; and,
- Incorporation of undergraduate research opportunities based on nanoscale science and engineering into the curriculum at any level, particularly during first- and second-year studies.

Proposals similar to those defined by this solicitation may also be submitted to the NSF Course, Curriculum, and Laboratory Improvement (CCLI) program managed by the Division of Undergraduate Education, see <http://www.ehr.nsf.gov/duet/programs/ccli>. The same proposal, however, cannot be simultaneously submitted to both NUE and the CCLI program.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this solicitation with the following program-specific limitations.

(NISE)

Lead Organization. The lead organization for this project must be a science museum or similar organization with the expertise in developing and implementing major informal science education projects at a national level, extensive experience in collaborating with research centers and other ISE organizations, and appropriate internal financial and management systems. Formal education institutions are not eligible to serve as the lead organization under this solicitation (unless they are the parent organization for the lead science museum).

ISE Organizations. Partner organizations may include other science museums, professional organizations, television and radio stations, community organizations, libraries, and other types of informal learning organizations of all sizes. Diversity is expected in the capabilities, audiences, and geographic locations of the participating organizations. ISE organizations cannot be partners on more than one NISE proposal, but may subsequently be incorporated into the Network created through this award. Non-U.S. informal science education organizations may participate in Network activities using their own resources.

Research Organizations. Eligible organizations include NSF-supported centers performing research in nanoscale science and engineering. Illustrative examples can be found at <http://www.nsf.gov/home/crssprgm/nano/centers.htm> and <http://www.mrsec.org>. Eligible research organizations are not limited to those listed at these web sites. Non-U.S. research organizations may participate in Network activities using their own resources.

(NUE)

Any U.S. academic institution having undergraduate programs in disciplines usually supported by NSF may submit proposals. Projects may be proposed by individual investigators or by groups from academic institutions. Synergistic collaboration among researchers and collaborations or partnerships with industry, government laboratories, and foreign institutions are encouraged when appropriate. NUE proposals involving more than one institution must be submitted as a single administrative package with the managing Principal Investigator (PI) from the lead institution. Non-U.S. institutions may participate in project activities using their own resources.

IV. AWARD INFORMATION

Estimated program budget, number of awards, and average award size/duration are subject to the availability of funds and the quality of proposals.

[A] Nanoscale Informal Science Education (NISE):

- Anticipated Type of Award: Cooperative Agreement
- Estimated Number of Awards: One
- Anticipated Funding Amount: Expected FY 2005 funding is \$4,500,000
- Estimated Award Size: Up to \$4,500,000 per year for each of five years

NSF plans to support a single national network. To ensure development of a comprehensive network, NSF may combine elements from more than one meritorious proposal. This award may be renewed once, without recompetition, for an additional five years, subject to external merit review and availability of funds. Recompensation will be required after ten years.

[B] Nanotechnology in Undergraduate Education (NUE):

- Anticipated Type of Award: Standard Grant for duration of two years
- Estimated Number of Awards: Up to 15
- Anticipated Funding Amount: Expected FY 2005 funding is \$3,000,000
- Estimated Award Size: Up to \$200,000 total for two years

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (*required*):

Letters of Intent (LOI) are required for NISE proposals ONLY. NUE proposals DO NOT require a LOI.

PIs must complete the required fields in FastLane and submit by the Deadline Date. Only one LOI can be submitted by an organization. Note that the LOI must properly identify the solicitation number for this program.

The Synopsis should succinctly describe the deliverables and intended impacts. The Other Comments field should summarize the organization of the Network. Note that each field is limited to 2,500 characters. Up to 25 partner organizations can be identified in the LOI as Participating Organizations; organizational listing in the LOI is not binding.

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation 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/cgi-bin/getpub?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.

[A] Specific to Full Proposals for NISE:

An organization must have submitted an LOI through FastLane by **February 6, 2005** to be eligible to submit a full proposal. **Proposals that do not meet this LOI requirement will be returned without review.**

Because preliminary proposals are not required, potential PIs are *strongly encouraged to contact the cognizant NSF Program Officer* listed in this Solicitation before submitting a proposal to discuss whether the proposed work is appropriate for this program.

All full proposals are submitted through FastLane. They must include: Cover Sheet, Project Summary, Table of Contents, Project Description, References Cited, Biographical Sketches, Budgets (including Justification), Current and Pending Support, and Supplementary Documents (as required). Specific requirements that supplement the Grant Proposal Guide are described below.

1. COVER SHEET

Proposers are reminded to include the program solicitation number of this solicitation and to identify the NSF Organization Unit as ESI - Informal Science Education. Failure to do so will delay processing of the proposal.

The title for the proposal should begin **NISE** followed by a colon and the remainder of the title.

2. PROJECT SUMMARY

This summary must make the essence of the proposed project clear to the reader. It must succinctly describe the Network deliverables and demonstrate how they will achieve the intended audience and strategic impacts, and address the characteristics of innovation and collaboration, within the context of the stated goals for the Network. The Project Summary is limited in length to two single-spaced pages.

The Project summary must explicitly address the project's Intellectual Merit and Broader Impacts (including the Additional Review Criteria in Section VI.A) in separate sections labeled as such, otherwise **the proposal will be returned without review**.

3. PROJECT DESCRIPTION

The Project Description must explicitly address the following questions in the format presented. This narrative is limited to no more than 25 single-spaced pages with 12-point type with one-inch margins. Although certain Supplementary Documents may be necessary, the Project Description must be able to stand on its own. Refer to Section II.A. of this solicitation and to the Informal Science Education program Solicitation for further description of project characteristics of strategic impact, innovation, and collaboration.

a. *Impact*

1. STRATEGIC IMPACT. What is the most critical strategic impact on informal nanoscale science, engineering, and technology education that the proposed Network intends to produce? What continuing long-term impact is the Network likely to have?
2. PUBLIC AUDIENCES. Who are the primary target audiences and what strategies are proposed for each major audience segment? How many individuals will be directly reached by the Network and its activities during the award and up to five years following the grant period (assuming no renewal of the award)? Provide a basis for this estimate. How does the Network broaden participation of underserved audiences? Describe your strategies for attracting and engaging these audiences.
3. PROFESSIONAL AUDIENCES. What are the types of ISE organizations on which the Network will have the greatest impact? What categories of professionals does the Network specifically target to achieve this impact?
4. KNOWLEDGE OF AUDIENCES. What do you already know about the knowledge, interests, attitudes, and needs of your public and professional target audiences? How do you know? What compelling target audience needs does the Network address?
5. AUDIENCE IMPACTS. What are the intended impacts of the Network on its target audiences? Identify the most important intended public and professional audience impacts (up to five each). For each, indicate how you will measure or assess that impact and what value of that measure or evidence will serve as your criterion for defining success. Explain your selections and provide the rationale for your selections.
6. IMPACT EVALUATION. What is the evaluation strategy you will use for the public and professional impact measures or assessments that you have identified? Provide a rationale. Include in the Supplementary Documents a more detailed evaluation plan that clearly identifies the methodologies that will be used for each impact measure. Proposals should include evaluation of the impact of the deliverables produced, as well as the effectiveness of the collaborative models employed.

b. *Innovation*

1. PROJECT DELIVERABLES. What Network deliverables for public and professional audiences will this project produce? Describe each deliverable in enough detail for reviewers to assess its ability to achieve the intended impacts. What are the "theories of

action" linking proposed activities with intended audience outcomes? How did you select the public and professional audience deliverables and how will they be integrated to produce the greatest impact? What is your project plan? What is the process by which each deliverable will be developed to achieve the greatest impact? What are the evaluation strategies you will use in developing your deliverables?

Note: Because of the nature of this initiative, only a first phase of public and professional deliverables developed within the early years of the award need be identified with specificity. The proposal must describe, however, the process by which these and subsequent Network deliverables are identified, planned, developed, implemented, evaluated, and disseminated to achieve the greatest impact on target audiences and how innovation will be fostered at each phase. What are the areas of greatest potential risk in successfully achieving the intended Network impacts? Describe your strategies for minimizing these risks.

2. EDUCATIONAL RESEARCH AND PRIOR WORK. How do your deliverables and project design build on specific findings from informal learning research? How do they build on and extend prior related practice in the field? How do they build on prior NSF-funded work by the PI, if any?

c. Collaboration

1. PROJECT TEAM. For each of the following categories, who are the key project team members, their areas of expertise, their roles, and their extent of commitment to this project? Provide a rationale for your selections.

- a. Senior Staff
- b. Advisory Committee Members
- c. Consultants
- d. Contractors

Note: One organization must serve as the lead organization for the Network. The lead provides the link between nanoscale science and engineering research organizations and informal learning organizations. In addition to coordinating Network activities, it should serve as a research and development center for public engagement in and understanding of nanoscale science, engineering, and technology.

2. PARTNERS. Who are your primary organizational partners? Identify each organization, its capabilities, strengths, role in the project, extent of commitment, and contact person. Why were these partners selected? What has been the extent of their involvement in planning this project?

Note: The research centers in nanoscale science and engineering should serve as the primary scientific and technical resources for the Network. They should make available advisors and content experts on nanoscale science, engineering, and technology, collaborate in concept and prototype development, and review for accuracy all products being developed.

ISE organizational partners should serve as vehicles for reaching public audiences. In addition, they should participate as active collaborators in planning and development and provide audience feedback through front-end and formative testing of products and programs, as well as linkages with K-12.

Note that the NCLT will be incorporated as a partner into the Network of the project

that is funded. To maintain the confidentiality of competing proposals, NCLT participation will be understood, and it should not be included as an exclusive partner at this stage.

3. NETWORK. What is the structure of the proposed Network? (The Network may consist of subnetworks, such as of research centers and of ISE organizations.) What are its capabilities? How will the Network partner organizations work together to achieve the deliverables and produce impacts that would not otherwise be possible? What is the strategy for fostering effective collaboration among the partners?
4. MANAGEMENT STRUCTURE. What is the management structure for the Network? What is the plan for establishing, maintaining, and expanding the Network over time? What is the method of selection, tenure, and responsibilities of those playing key management roles? What are the provisions for oversight, including external advisory bodies, their composition, responsibilities, and means for advising management? What is the process for setting goals and planning? What is the procedure for adding or replacing ISE organizations or other partners?

4. BUDGET

The budget should provide the most cost-effective means for producing the deliverables and achieving the intended impacts. It must be accompanied by an itemization and explanation, up to three pages long, that corresponds to the NSF budget lines. Each Subaward (on line G.5) requires its own complete set of Proposal Budget forms accompanied by an itemization no more than one page in length.

Funds cannot be requested for operational expenses or for equipment that is not an essential component of a project deliverable, such as an exhibition. Note that any consultants included in line G.3 must be compensated on a daily rate, not to exceed the current NSF maximum.

Even though cost sharing is no longer required by NSF, if a proposal requires other sources of funding, the scope and cost of the entire project must be provided in enough detail to identify the work to be performed and/or funded by parties other than NSF. Reviewers will need this additional information in order to assess the viability of the overall project, as well as the scope and budget to be funded by NSF.

The estimated budget to be funded by sources other than NSF does not have to be entered on a FastLane budget form, but should use the same format and major budget categories for comparison with the NSF budget. See Section II for additional information.

Proposals must include in the Supplementary Documents a spreadsheet that presents the total project budget for each year and cumulative. Rows should correspond to the NSF budget line items, and columns should show the funds requested from NSF, the funds provided from other sources, and the total for each line item.

Reference to these additional funds is for informational purposes only, and they will not be subject to audit.

5. CURRENT AND PENDING SUPPORT

Proposals must include this form for the PI, any co-PIs, and senior project personnel. The proposal being submitted should be listed first on the form and identified as pending.

6. SUPPLEMENTARY DOCUMENTS

Although the Project Description should provide sufficient information for a reviewer unfamiliar with the specific content or context to make a reasoned judgment, it may be necessary to provide some additional

supporting information. However, because reviewers may be required to assess a substantial number of competing proposals, **PIs must be extremely judicious in the number of pages submitted.** *Do not include brochures, lengthy publications, or entire reports (executive summaries only).*

Letter(s) describing the intellectual commitment of organizational partners signed by a senior official with budget authority to implement the activities listed in the proposal if awarded must be included. The letters should be referenced in the Project Description and outline the organization's role in and commitment to the project. If these signed statements are not submitted in the Supplementary Documents section, the proposal will be returned to the PI without review.

Media that cannot be submitted through FastLane may be provided in the form of DVD, CD-ROM, VHS or audiotape; 15 copies, labeled with proposal number, title, and PI, must be sent to: Informal Science Education Program, EHR/ESIE, Room 885, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230 [phone: (703) 292-5087]. These materials, which will not be returned, must be received within 5 business days following electronic submission; clearly mark the package *re*: Supplementary Documents and indicate the proposal number from FastLane.

[B] Specific to Full Proposals for NUE:

Proposals submitted in response to this program solicitation must be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide (GPG)*.

Additional review criteria described below should be addressed when preparing a proposal. **The Project Description for NUE proposals may not exceed 15 single-spaced pages in 12-point type with one-inch margins.** Submission by FastLane is required for full proposals.

1. COVER SHEET

Proposers are required to identify the relevant proposal component, "**Nanotechnology Undergraduate Education,**" in the block titled "For consideration by NSF organizational unit." The proposal title should begin with component acronym: "**NUE**". For administrative purposes, all NUE proposals must be submitted via FastLane to EEC (contact Mary Poats, mpoats@nsf.gov).

2. PROJECT SUMMARY

The proposal must contain a summary of the proposed activity suitable for publication, not more than one page in length. It should not be an abstract of the proposal, but rather a self-contained description of the activity that would result if the proposal were funded. The summary should be written in the third person and include a statement of objectives and methods to be employed. It must clearly address in separate statements (within the one-page summary): (1) the intellectual merit of the proposed activity; and (2) the broader impacts resulting from the proposed activity. (See Chapter III (GPG) for further descriptive information on the NSF merit review criteria.) It should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader.

If the Summary does not explicitly address the project's Intellectual Merit and Broader Impacts (including the Additional Review Criteria in Section VI.A) in separate sections labeled as such, **the proposal will be returned without review.**

3. PROJECT DESCRIPTION

The project description for NUE should contain the following components:

- a. **Goals and Objectives.** The goals of the project should be stated clearly and concisely in relation to the goals of the NUE component.

- b. **Results of Prior NUE Support.** In addition to results of prior support as required by the NSF GPG, institutions participating in prior NUE awards must describe the relationship of that award to this new proposal.
- c. **Detailed Project Plan.** The project plan should be the longest section of the Project Description. It should include description of the project's features, clearly delineating the plan to introduce or enhance nanotechnology in the undergraduate curriculum. The plan should include:
- Background on the proposed project describing how it builds on nanoscale and/or pedagogical research;
 - Statement describing the expected impact of the project on the undergraduate curriculum at the participating institution(s) and, if applicable, elsewhere;
 - Number and percentage of undergraduate students who would be impacted by the project at the participating institution(s), and the extent to which under-represented groups would be served;
 - Plans for institutionalization of projects; and
 - References to required letter(s) of institutional and departmental commitments noted under *Supplementary Material* (see below).
- d. **Experience and Capability of the Principal Investigator(s).** Briefly describe the experience and capability of the PI(s). Include a brief description of the rationale for including the specific faculty members and institutional units within the project. State the role of each and cite the expertise that each will contribute to the project.
- e. **Evaluation Plan.** Describe criteria to be used in evaluating the quality and impact of the project, how the project's impact on student learning will be assessed, and the process for collecting and analyzing information at the applicant's institution or from others involved in testing of course materials developed. The following references may be helpful in designing the evaluation plan:
- The 2002 User Friendly Handbook for Project Evaluation (NSF 02-057). See: <http://www.ehr.nsf.gov/rec/programs/evaluation/handbook/>.
 - User Friendly Handbook for Mixed Method Evaluations (NSF 97-153). See: <http://www.ehr.nsf.gov/EHR/REC/pubs/NSF97-153/start.htm>
 - Online Evaluation Resource Library. See: <http://oerl.sri.com>
 - Field-tested Learning Assessment Guide (FLAG). See: <http://www.wcer.wisc.edu/nise/CL1/flag/>
- f. **Dissemination of Results.** Describe plans to communicate the results of the project to other professionals in the STEM and education communities, both during and after the project. Describe the information or materials to be disseminated (e.g., computer presentations, laboratory manuals, software, multimedia materials); how the material will be made available to other institutions; the means of dissemination (e.g., faculty development workshops, journal articles, conference presentations, electronic networks, media); and the procedures for determining the success of the dissemination effort. Describe procedures to be used to maintain the quality and currency of any material developed, to provide support for faculty users, and to publicize the availability of materials.

Investigators are encouraged to use the National Science, Technology, Engineering, and Mathematics Education Digital Library (NSDL), as part of their dissemination efforts, see <http://nsdl.org>. To ensure that educational materials can be indexed and cataloged within the appropriate collections of NSDL, standard metadata elements and tags should be embedded in web-based products, e.g. documents, animations, simulations, and modules. A variety of review and user annotation procedures are also under development as NSDL services. Information about metadata standards is available from the Dublin Core Metadata Initiative at <http://dublincore.org> and the NSDL Metadata Primer at <http://metamanagement.com.nsdlib.org/outline.html>. The NSDL Communications Portal at <http://comm.nsdlib.org> provides updates of ongoing NSDL efforts and discussions.

4. BUDGET

Adhere to the Guidelines in the GPG.

5. CURRENT AND PENDING SUPPORT

Proposals must include this form for the PI, any co-PIs, and senior project personnel. The proposal being submitted should be listed first on the form and identified as pending.

6. SUPPLEMENTARY DOCUMENTS

Letter(s) describing the intellectual commitment of institutional and academic department(s) signed by a senior academic officer (dean or above) with budget authority to implement the activities listed in the proposal (if awarded) must be included as a Supplementary Document. The letter(s) should be referenced in the Project Description and outline the school's and department's commitment to the project and how the project may effect a lasting change at the institution. If these signed statements are not included in the Supplementary Documents section of FastLane, the proposal will be returned to the Principal Investigator without review.

Because this NSEE component does not require preliminary proposals, potential PIs are encouraged to contact one of the NUE Cognizant Program Officers listed in this solicitation before submitting a proposal. The Program Officer will help the PI determine whether the proposed work is appropriate for NUE.

Proposers are reminded to identify the program announcement/solicitation number (05-543) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

Letters of Intent (*required*):

February 06, 2005

Nanoscale Informal Science Education (NISE) program ONLY. The NUE program does NOT require a Letter of Intent.

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

April 06, 2005
Nanotechnology Undergraduate Education (NUE)

April 06, 2005
Nanoscale Informal Science Education (NISE)

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for 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/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria

within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). 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 he/she is qualified to make judgments.

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 and original 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?

NSF staff 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.

Additional Review Criteria:

For NISE Proposals:

NISE reviewers will consider the following as specific aspects of Intellectual Merit and Broader Impacts.

In addition, *reverse site visits* will be carried out as part of the merit review process for the most highly rated NISE proposals following panel review.

Within Intellectual Merit, reviewers will assess:

Deliverables. Does this project creatively "push the envelope" in enhancing informal science learning? Have the deliverables been selected and integrated to achieve the greatest Network and project impacts? Are front-end and formative evaluation efforts adequate for their development? Are their scope and depth of STEM content based on nanoscale science, engineering, and technology appropriate to the target audience? (Innovation)

Project Design. Are the deliverables, Network and project design, and timeline well developed and organized to produce the specified impacts? Do the Network and project design build on informal learning research and on lessons learned from prior efforts? Is the proposed budget reasonable and adequate? Does the proposal present meaningful strategies for managing potential risks? (Innovation)

Project Team. Is the team qualified to carry out the project? Do external advisors provide the expertise necessary to conduct the project, including relevant expertise based in informal science learning, STEM content, any media used, and evaluation? (Collaboration).

Partnerships. Are the design and implementation of the proposed Network and collaborations likely to achieve the intended project outcomes? Is there a credible strategy and plan for managing and strengthening collaboration among the partners? (Collaboration)

Within **Broader Impacts**, reviewers will assess:

Strategic Impact. Is the Network likely to have a meaningful impact on the theory or practice of informal science education in addition to serving any audiences directly? (Impact)

Audience. Are the primary target audiences, as well as any secondary audiences, clearly identified and segmented into subgroups as appropriate? Does the project demonstrate knowledge about the target audiences, their needs, and their interests? (Impact)

Public Audiences. Will the Network and project likely achieve a significant impact on the target audience of informal learners? Does the Network offer effective ways to reach nontraditional audiences and underrepresented groups? (Impact)

Professional Audiences. Will the Network likely achieve a significant impact on professionals in the field of informal science learning? (Impact)

Impact Evaluation. Are there clear and appropriate measures and criteria for defining Network and project success? Is there an appropriate summative evaluation plan for assessing impact? Is there an effective plan for broadly sharing project outcomes and findings? (Impact)

For NUE Proposals:

In addition to the two NSB criteria described above, the following elements will be used by reviewers and NSF staff in evaluating all NUE proposals:

- the extent to which creative, interdisciplinary approaches to nanotechnology undergraduate education are fostered;
- the likelihood that the project will engage students and faculty at participating institutions (and, if applicable, elsewhere) in undergraduate nanotechnology education;
- soundness of plans for project assessment, institutionalization, and dissemination beyond the faculty members involved in the proposal;

- potential impact on developing a diverse workforce and enhancing science literacy; and
- the scale of the potential impact.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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 Division 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.A. 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 (NSF-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 agreement awards also are administered in accordance

with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/home/grants/grants_gac.htm. 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 is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

Special Award Conditions:

For NISE Proposals: The award under this Solicitation will be made as a Cooperative Agreement to the lead organization. It may be renewable for an additional five years without recompetition, subject to merit review.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Projects may be required to provide data and relevant qualitative information to an NSF third-party evaluator.

(NISE) Summative evaluations will be required to be posted at www.informalscience.org.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, 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.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Mary F. Poats, for *Nanotechnology Undergraduate Education (NUE)*, Program Director, Directorate for Engineering, Division of Engineering Education & Centers, 585 N, telephone: (703) 292-5357, fax: (703) 292-9051, email: mpoats@nsf.gov
- David A. Ucko, for *Nanoscale Informal Science Education (NISE)*, Section Head, Science Literacy, Directorate for Education & Human Resources, Division of Elementary, Secondary, & Informal Education, 885 S, telephone: (703) 292-5126, fax: (703) 292-9044, email: ducko@nsf.gov
- Sankar Basu, for *Nanotechnology Undergraduate Education (NUE)*, Program Director, Directorate for Computer & Information Science & Engineering, Division of Computing and Communication Foundations, 1115 N, telephone: (703) 292-8910, fax: (703) 292-9059, email: sabasu@nsf.gov
- Duncan E. McBride, for *Nanotechnology Undergraduate Education (NUE)*, Section Head, Directorate for Education &

Human Resources, Division of Undergraduate Education, 835 N, telephone: (703) 292-4630, fax: (703) 292-9015, email: dmcbride@nsf.gov

- Charles D. Pibel, for Nanotechnology Undergraduate Education (NUE), Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4971, email: cpibel@nsf.gov
- Ronald Rainger, for Nanotechnology Undergraduate Education (NUE), Program Director, Directorate for Social, Behavioral & Economic Sciences, Division of Social and Economic Sciences, 995 N, telephone: (703) 292-7283, email: rrainger@nsf.gov
- Larry H. Weber, Senior Program Officer, Office of the Director, Office of International Science and Engineering, 935 N, telephone: (703) 292-8704, fax: (703) 292-9175, email: lweber@nsf.gov

For questions related to the use of FastLane, contact:

- Jeffrey S. Harris, Science Education Analyst, Directorate for Education & Human Resources, Division of Elementary, Secondary, & Informal Education, 885 S, telephone: (703) 292-5103, fax: (703) 292-9044, email: jsharris@nsf.gov
- Sarita Shephard, Program & Technology Analyst, Directorate for Education & Human Resources, Division of Elementary, Secondary, & Informal Education, 885 S, telephone: (703) 292-7422, fax: (703) 292-9044, email: sshephar@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.



The National Science Foundation
4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: 703-292-5111, FIRS: 800-877-8339 | TDD: 800-281-8749

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