National Science Foundation

Funding Opportunities in Education with the National Science Foundation

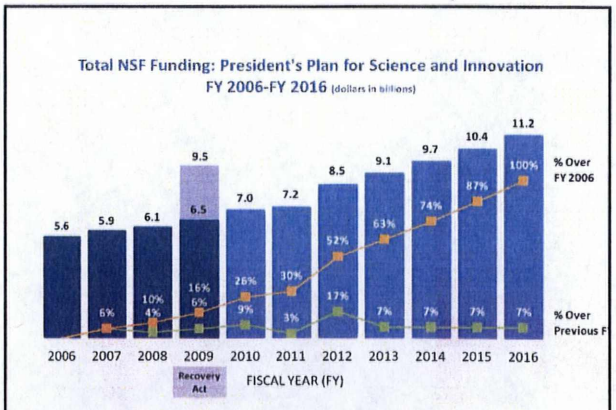
Linda P. Thurston, Ph.D.
Program Officer, Research in Disabilities Education
Division of Human Resource Development

AGENDA

- National context for STEM
- NSF mission and organization
- Funding opportunities in the
  - Division of Education and Human Resource Development (HRD)
- Other NSF opportunities
- How to get started
- Suggestions for success

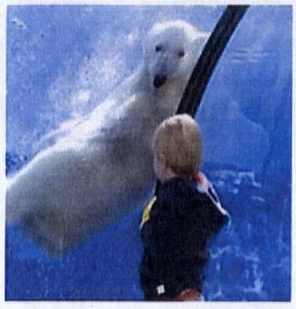
STEM Education in the US Context

- President Obama's 2020 goal
- America Competes Act
- *Rising Above the Gathering Strom Revisited* (NAC, 2010)
- Educational research
- *Prepare and Inspire: K-12 Education in STEM for America's future*, 201



NSF Vision

Advancing discovery, innovation, and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.



Arctic Exhibit – Detroit Zoo

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New NSF Strategic Goals

- **Transform the Frontiers**
- **Innovate for Society**

Core Strategies

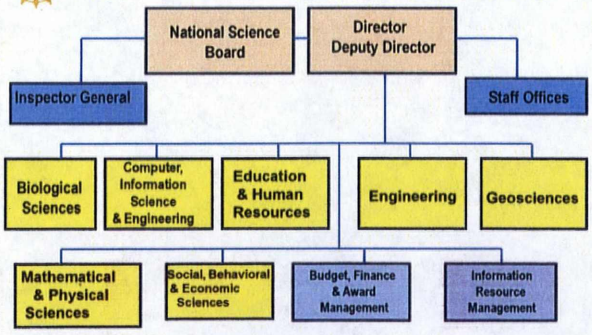
* Be a leader in envisioning the future of science and engineering.

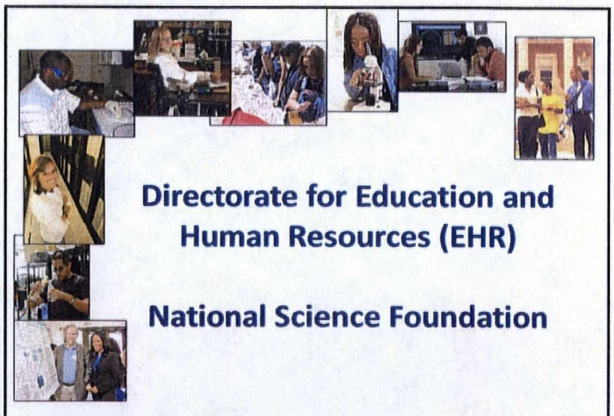
* Integrate research and education and build capacity.

* Broaden participation.

* Learn through assessment and evaluation of NSF programs, processes and outcomes; continually improve them; and employ outcomes to inform NSF planning, policies and procedures.

NSF Offices and Directorates

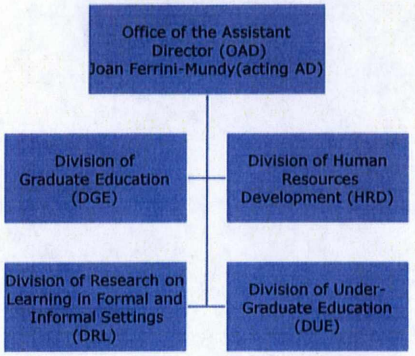




Directorate for Education and Human Resources (EHR)

National Science Foundation

Directorate for Education and Human Resources



The EHR *Enterprise* at NSF: Program Overview

- Education, research, development, evaluation
- Teacher development, capacity building and partnerships in K-12 Education
- Broadening participation; support for Minority Serving Institutions (MSIs)
- STEM Career Pathways: Undergraduate Education
- Public Engagement with Science
- Innovation in Graduate Education



Research Programs	Research and Development Programs	Programs with Research Tracks	Programs to Support Development of Education Research Workforce
Research and Evaluation on Education in Science and Engineering (REESE)	Cyberlearning Transforming Education (CTE) – Proposed for FY2011 with support across five EHR programs (DR K12; ISE; TUES; CREST; NSDL)	Innovative Technology Experiences for Students and Teachers (ITEST)	Fostering Interdisciplinary Research on Education (FIRE) – a strand of the Research and Evaluation on Education in Science and Engineering (REESE) program.
PRIME	Discovery Research K-12 (DR-K12)	Informal Science Education (ISE)	Graduate Research Fellowships (GRF)
Research in Disabilities Education (RDE)	Climate Change Education Partnerships (CCEP) – with support from the BIO and GEO Directorates, and OPP	Historically Black Colleges and Universities, Undergraduate Program (HBCU-UP)	Faculty Early Career Development (CAREER) proposals to the EHR Directorate
Research on Gender in Science and Engineering (GSE)	Math and Science Partnership (MSP)	Louis Stokes Alliances for Minority Participation (LSAMP)	
STEM Talent Expansion (STEP) – Track II	Transforming Undergraduate Education in STEM (TUES)	Advanced Technological Education (ATE)	
Math and Science Partnership (MSP) Research, Evaluation, and Technical Assistance (RETA)	Transforming STEM Learning (TSL)		

Education Research, Development, Evaluation

Discovery Research K-12 (DR-K12) enables advances in student and teacher learning of the STEM disciplines through research and development on innovative resources, models, and technologies.

Research and Evaluation on Education in S&E (REESE) advances research at the frontiers of STEM learning, education, and evaluation, and provides the foundational knowledge necessary to improve STEM teaching and learning at all

Fostering Interdisciplinary Research on Education (FIRE) strand in the **REESE** program seeks proposals by which scholars can cross disciplinary boundaries and facilitate the development of innovative theoretical, methodological, and analytic approaches to STEM education issues of national importance

Discovery Research K-12 (DRK-12)

Program Solicitation 09-602

- Proposals due **January, 2011**
- Enables advances in PK-12 student and teacher learning of the STEM disciplines through the development, implementation, and study of resources, models, and technologies
- Four program challenges
- Four award types

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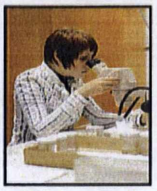
Education Research, Development, Evaluation [cont'd]



Research on Gender in S&E (GSE) seeks to broaden the participation of girls and women in all fields of STEM education by supporting research, the diffusion of innovations, and extension services.

Research in Disabilities Education (RDE) seeks to increase the participation of persons with disabilities in STEM education and careers. Emphasis is placed on contributing to the knowledge base.

Undergraduate student teachers use SimSchool® module to learn to how to teach students with disabilities

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Education Research, Development, Evaluation [cont'd]

Transforming STEM Learning (TSL) program invites interdisciplinary proposals to study prototypes for innovations like virtual schools; and design and conduct exploratory development of new, potentially transformative models for STEM learning environments.

Promoting Research & Innovation in Methodologies for Evaluation (PRIME) supports research on evaluation; explores innovative new approaches for determining impacts and usefulness of STEM education activities.

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Teacher Development, Capacity Building and Partnerships in K-12 Education

Innovative Technology Experiences for Students and Teachers (ITEST) program supports research about the growing demand for professionals and information technology workers in the U.S. and seeks solutions to help ensure the breadth and depth of the STEM workforce.

Robert Noyce Teacher Scholarship (NOYCE) program seeks to encourage talented STEM majors and professionals to become K-12 mathematics and science teachers and provides scholarships and stipends for students holding STEM degrees who earn a teaching credential and commit to teaching in high-need K-12 school districts.

Cal State, Long Beach, NOYCE Scholars

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Teacher Development, Capacity Building and Partnerships in K-12 Education [cont'd]

Appalachian MSP Project

Math and Science Partnership (MSP) program is a major R&D effort supporting innovative partnerships to improve K-12 student achievement in math and science. MSP projects contribute to what is known in math and science education and serve as models that have a sufficiently strong evidence/research base to improve student outcomes.

NSF Graduate STEM Fellows in K-12 (GK-12) enhances graduate students' teaching skills and improves STEM teaching and learning within K-12 classrooms through sustained partnerships between institutions of higher education and local school districts.

U. Arkansas GK-12 Project

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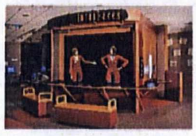
Public Engagement in Science

Mute Swan spotted by "Citizen Counter" Darla May of Ft. Lauderdale, FL, participating in the 2008 NSF-funded *Great Backyard Bird Count*

Informal Science Education (ISE) program supports innovation in anywhere, anytime, lifelong learning, through investments in research, development, infrastructure, and capacity-building. ISE also supports PIs of NSF-funded research projects for *Communicating Research to Public Audiences*

Climate Change Education (CCE) supports a broad range of efforts to enhance climate literacy and to enable individuals and communities to make informed, responsible decisions regarding actions affecting climate



Virtual Human Museum Guides and Living Laboratory Exhibit at the Boston Museum of Science

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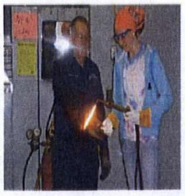
STEM Career Pathways: Undergraduate Education



ATE Technician Training Project

Advanced Technological Education (ATE) focuses on education of technicians for high-technology fields that drive our nation's economy. Partnerships among academia and industry are prominent features

STEM Talent Expansion Program (STEM) supports projects leading to an increase in the number of students earning STEM degrees. Educational research projects on degree attainment in STEM are encouraged.

NSF Scholarships in STEM (S-STEM) makes grants to institutions of higher education to support scholarships for academically talented, financially needy students for an associate, baccalaureate, or graduate level degree.

STEM Career Pathways: Undergraduate Education [cont'd]

Customized, scaled model of a city water supply system used by NSF Cyber Corps students to test operating software weaknesses.

Federal Cyber Service: Scholarship for Service (SFS) supports scholarships and capacity building activities designed to increase the number of qualified students entering the fields of information assurance and computer security.

Transforming Undergraduate Education in STEM (TUES) supports efforts to create, adapt, and disseminate new learning materials and teaching strategies, develop faculty expertise, implement educational innovations, assess learning and evaluate innovations, and conduct research on STEM teaching and learning.

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Innovation in Graduate Education

Integrative Graduate Education and Research Traineeship (IGERT) supports education of U.S. Ph.D. scientists and engineers with the deep interdisciplinary knowledge and technical, professional, and personal skills to become leaders and creative agents for change.

IGERT-funded researcher develops hand-held terahertz spectrometer.

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Innovation in Graduate Education [cont'd]

Graduate Research Fellowships (GRF) awards support for graduate study leading to research-based masters or doctoral degrees. Provides three years of support within a five-year period, which may be used at an institution in the U.S. or abroad.

NSF Graduate STEM Fellows in K-12 (GK-12) provides funding to broadly prepare graduate students for professional careers and, through interactions with teachers in K-12 schools, improve their communication and teaching skills and enrich STEM instruction in K-12 schools.

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Support to Minority-Serving Institutions

Sitting Bull College students gather nets capturing animal field data in environmental science research.

Tribal Colleges and Universities (TCUP) program enhances the quality of STEM instructional and outreach programs at Tribal, Alaskan Native-serving, and Native Hawaiian-serving institutions.

Centers of Research Excellence in Science and Technology (CREST) enhances research capabilities of minority serving institutions and their faculty through effective integration of education and research, and expands the presence of students historically underrepresented in STEM disciplines

Historically Black Colleges and Universities—Undergraduate Program (HBCU-UP) seeks to increase the quality of STEM education at Historically Black Colleges and Universities, addressing their STEM needs goals and mission.

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Large-Scale Programs for Broadening Participation

Undergraduate research fellows with disabilities work at U. Southern Main laboratory.

Research in Disabilities Education (RDE) seeks to increase the participation of persons with disabilities in STEM education and careers. Emphasis is placed on research to expand the knowledge base in disabilities education.

Alliances for Graduate Education and the Professoriate (AGEP) aims to increase the number of underrepresented minorities receiving PhD degrees in STEM.

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Large-Scale Programs for Broadening Participation [cont'd]

Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE) develops systematic approaches to increase the representation and advancement of women in academic science and engineering careers.

Louis Stokes Alliances for Minority Participation (LSAMP) seeks to increase the quality and quantity of students receiving baccalaureate degrees in STEM fields, and provides a "Bridge to the Doctorate" component.

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Division of Human Resource Development (HRD)

To increase the participation and advancement of underrepresented minorities and minority serving institutions, women and girls, and persons with disabilities at every level of the STEM enterprise

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HRD Programs

ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (10-593)

Alliances for Graduate Education and the Professoriate (AGEP) (10-605)

Louis Stokes Alliances for Minority Participation (LSAMP) and Bridge to the Doctorate Activity (10-522)

Centers of Research Excellence in Science and Technology (CREST) and HBCU Research Infrastructure for Science and Engineering (HBCU-RISE) (10-519)

Cooperative Activity with Department of Energy Programs for Education and Human Resource Development (Supplement) (10-019)

Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) (10-518)

Research in Disabilities Education (RDE) (09-508)

Research on Gender in Science and Engineering (GSE) (10-516)

Tribal Colleges and Universities Program (TCUP) (10-501)

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AGEP (Alliances for Graduate Education and the Professoriate) Program Logic Model

Program Goals: 1) Increase the number of domestic students receiving doctoral degrees in STEM, targeting those underrepresented in STEM fields (African Americans, Hispanics, American Indians, Alaska Natives, native Hawaiians or other Pacific Islanders; 2) Increase number of minorities (listed in #1) entering and succeeding in the professoriate in STEM fields.

Situation/Problem	Input (Resources Invested)	Activities /Training	Outcome Indicators	Short term Outcomes	Long term Outcomes
• Low incidence of minorities completing STEM doctorates • Low percentage of minority doctorates entering academic employment	• One program officer • Part time support staff • $16+M / year	• Formation of Alliances of doctoral granting institutions. • Career development opportunities for graduate and postdoctoral students at AGEP Alliance institutions.	•Number of underrepresented minorities (URM) who are doctoral and postdoctoral students participating in STEM programs at AGEP institutions. • Number of URM STEM doctoral and postdoctoral completers at AGEP institutions. •Number of URM completers who enter and are successful in academic careers.	• Increase number of individuals from underrepresented groups who complete a STEM doctorate or postdoc. • Increase the number of STEM doctorates who are successful in the professoriate in STEM fields.	• Strong diverse STEM academic workforce. • Increased success of academia in recruiting and educating a diverse student body in STEM.

Assumption: AGEP awardees will, cumulatively, contribute to a diverse, competitive, and globally engaged STEM academic workforce that will improve the quality and diversity of post-secondary education in STEM fields.

Research in Disability Education (RDE)

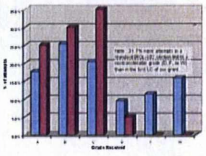
- Broadening participation of people with disabilities in STEM
- Funding research projects and alliances targeting post-secondary STEM degree completion

Program Directors: Mark Leddy and Linda P. Thurston

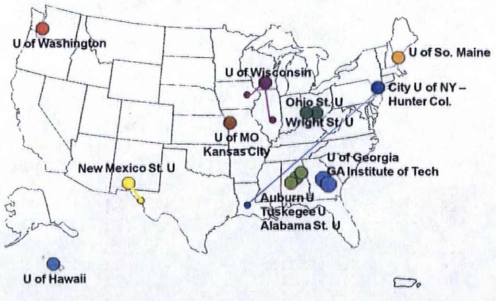
National Science Foundation

The *Research* in NSF's Research in Disabilities Education Program:




Alliances for Students with Disabilities in STEM



Education research elsewhere at NSF

- Mathematics and Physical Sciences Directorate (Education and Interdisciplinary Research)
- Engineering Directorate (Innovations in Engineering Education, Curriculum and Infrastructure program)
- Computer and Information Science and Engineering Directorates (new effort TBA in FY2011: Cyberlearning for Transforming Education)
- Social and Behavioral Sciences Directorate (Science of Learning Centers, Developmental and Learning Sciences, Social Psychology, and Linguistics)

Writing a Competitive Proposal:

- Familiarize yourself with the NSF website, especially the Grant Proposal Guide (GPG) and FastLane
- Read the solicitation (more than once)
- Talk to NSF Program Officers about your ideas
- Ground the proposed project in relevant and appropriate literature (perhaps outside of STEM education!)
- Get appropriate expertise on board
- Consider how to evaluate its success
- Partner-up
- Keep the bigger picture in mind

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Competitive proposals should include:

- STEM content clearly articulated (include examples!)
- Research design and methodology appropriate and sufficiently discussed
- Sensible chain of reasoning from research questions to analysis
- Strong arguments for importance of the problem
- Appropriate literature cited
- Impacts of the research addressed

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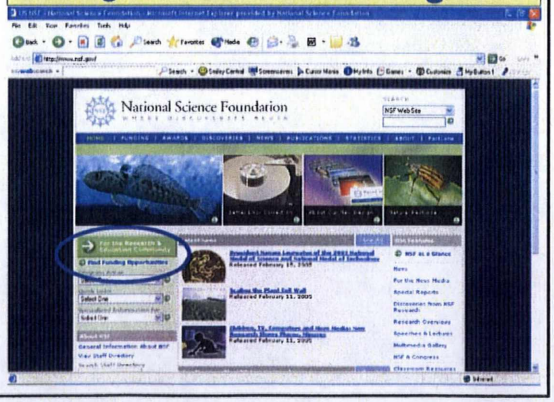
Getting Started: www.nsf.gov



National Science Foundation

Research in Disabilities Education (RDE)

Program **Solicitation**
09-508

Replaces Document(s):
NSF 08-527

National Science Foundation
Directorate for Education & Human Resources
Division of Human Resource Development

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):
February 18, 2009
Alliances for Students with Disabilities in STEM
February 18, 2009
Demonstration, Enrichment or Dissemination
February 24, 2009
Innovation through Institutional Integration

Discovery Research K-12 (DRK-12)

Program Solicitation 09-602

- Proposals due **January, 2011**
- Enables advances in PK-12 student and teacher learning of the STEM disciplines through the development, implementation, and study of resources, models, and technologies
- Four program challenges
- Four award types

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DR K-12 Program Information

- Challenges
  1. How can improved assessment of student knowledge and skills advance preK-12 STEM teaching and learning?
  2. How can all students be assured the opportunity to learn significant STEM content?
  3. How can we enhance the ability of teachers to provide STEM education?
  4. How are effective innovations successfully implemented, scaled, and sustained in schools and districts in a cost effective manner?
- Must be at the K-12 level

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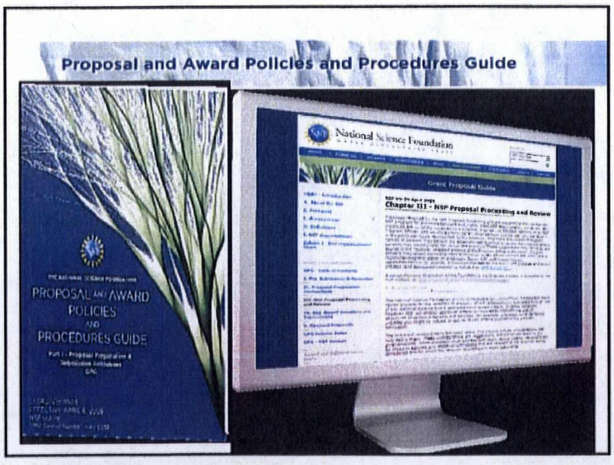

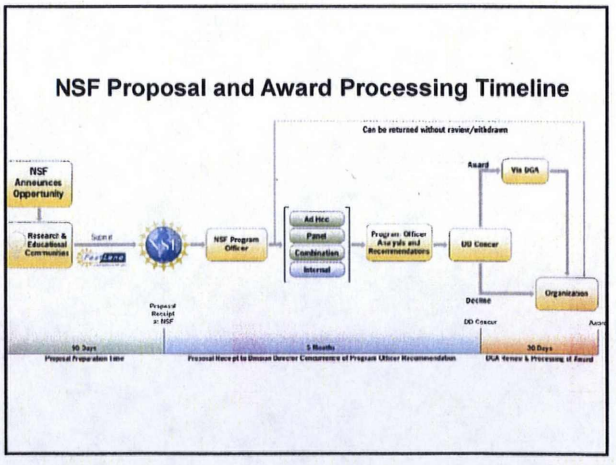

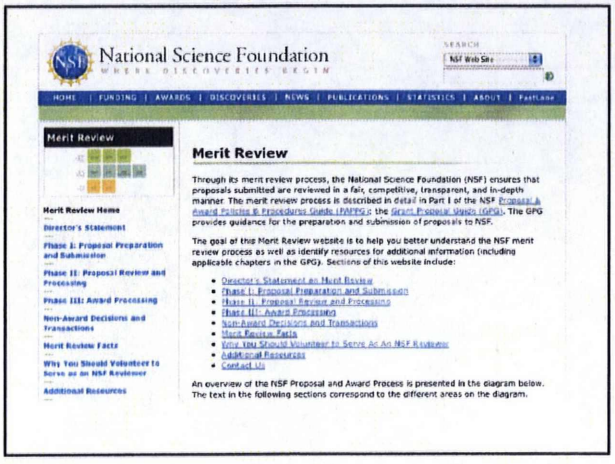
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WHERE DISCOVERIES BEGIN
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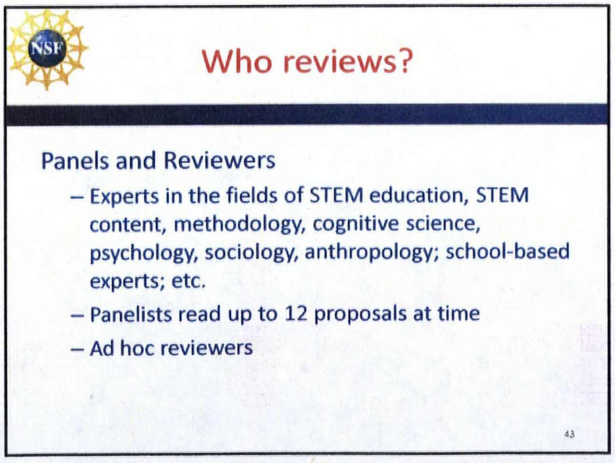
HOME | FUNDING | AWARDS | DISCOVERIES | NEWS | PUBLICATIONS | STATISTICS | ABOUT | FastLane
Merit Review
Merit Review Home
Director's Statement
Phase I: Proposal Preparation and Submission
Phase II: Proposal Review and Processing
Phase III: Award Processing
Non-Award Decisions and Transactions
Merit Review Facts
Why You Should Volunteer to Serve as an NSF Reviewer
Additional Resources
Merit Review
Through its merit review process, the National Science Foundation (NSF) ensures that proposals submitted are reviewed in a fair, competitive, transparent, and in-depth manner. The merit review process is described in detail in Part I of the NSF Proposal & Award Policies & Procedures Guide (PAPPG): the Grant Proposal Guide (GPG). The GPG provides guidance for the preparation and submission of proposals to NSF.
The goal of this Merit Review website is to help you better understand the NSF merit review process as well as identify resources for additional information (including applicable chapters in the GPG). Sections of this website include:
Director's Statement on Merit Review
Phase I: Proposal Preparation and Submission
Phase II: Proposal Review and Processing
Phase III: Award Processing
Non-Award Decisions and Transactions
Merit Review Facts
Why You Should Volunteer to Serve As An NSF Reviewer
Additional Resources
Contact Us
An overview of the NSF Proposal and Award Process is presented in the diagram below. The text in the following sections correspond to the different areas on the diagram.


Who reviews?
Panels and Reviewers
– Experts in the fields of STEM education, STEM content, methodology, cognitive science, psychology, sociology, anthropology; school-based experts; etc.
– Panelists read up to 12 proposals at time
– Ad hoc reviewers
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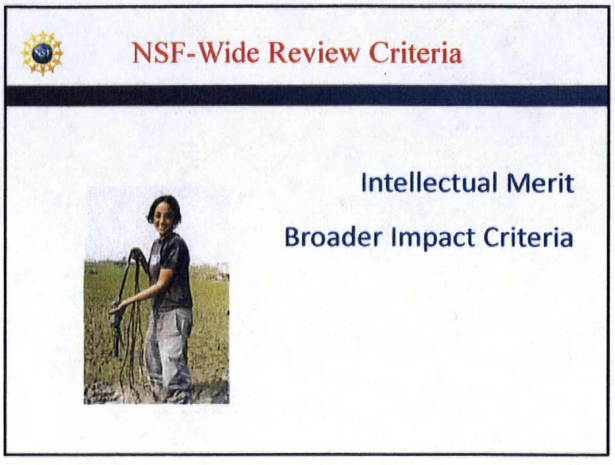
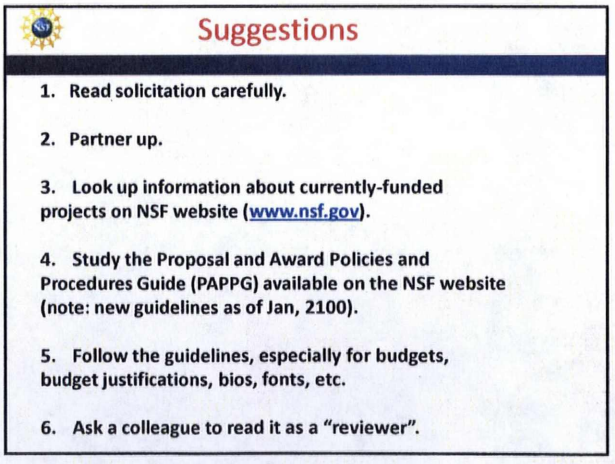

NSF-Wide Review Criteria
Intellectual Merit
Broader Impact Criteria


Suggestions
1. Read solicitation carefully.
2. Partner up.
3. Look up information about currently-funded projects on NSF website (www.nsf.gov).
4. Study the Proposal and Award Policies and Procedures Guide (PAPPG) available on the NSF website (note: new guidelines as of Jan, 2100).
5. Follow the guidelines, especially for budgets, budget justifications, bios, fonts, etc.
6. Ask a colleague to read it as a "reviewer".

Summing Up

- Start *EARLY*
- Get acquainted with FASTLANE (www.FastLane.nsf.gov)
- Read the Program Solicitation and *follow the guidelines and the GPG* http://www.nsf.gov/pubs/policydocs/pappguide/nsf10_1/gpg_index.jsp.
- Contact a program officer early.
- Volunteer to be an NSF reviewer.
- Subscribe to Custom News Services at NSF http://www.nsf.gov/mynsf/

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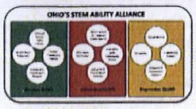
Collaboration Example: The Ohio State University

CEM Center for Emergent Materials — A National Science Foundation (NSF) Materials Research Science and Engineering Center (MRSEC)



- Collaboration between the NSF-funded Center for Emergent Materials, a MRSEC, and the RDE Ohio STEM Ability Alliance for students with disabilities at OSU and Wright State University.
- 462 K-12 students with a wide range of disabilities participated in CEM's Education and Outreach activities during the 08-09 school year as a result of the collaboration.
- OSAA awarded a $3M Choose Ohio First grant to establish undergraduate scholarships for students with disabilities in STEM fields.

Robert Hooper At CEM Robert had a high school internship and Ohio State School for the Blind worked on podcasts for high school teachers Metro Early College High School about current research in materials science.

Help Wanted

- Reviewers
  - Needed for all programs on panel and as ad hoc
  - Contact any Program Officer
- Program Officers
  - IPAs (see NSF website)

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Research in Disabilities Education — Division of Human Resource Development

Research in Disabilities Education
Division of Human Resource Development
Directorate for Education and Human Resources
National Science Foundation

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Program Director
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What can we do?

- Link the schola
  emphasis to th
  potentially trar
  research.