NSF Education Programs

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Division of Undergraduate Education
Overview

1. Organization/Mission of the Division of Undergraduate Education
2. Transformative education projects
3. STEM education funding opportunities
4. Questions and Answers
NSF Directorate for Education and Human Resources

- DUE
  Division of Undergraduate Education
- HRD
  Division of Human Resource Development
- DRL
  Division of Research on Learning in Formal and Informal Settings
- DGE
  Division of Graduate Education
- EHR
  Divisions
DUE’s Mission:

To promote excellence in undergraduate science, technology, engineering, and mathematics (STEM) education for all students.

Transformative Projects!
Transformative Activity

| Challenges conventional wisdom | Leads to unexpected insights that enable new techniques or methodologies | Redefines the boundaries of science, engineering, or education |

- Radically changes our understanding
- Leads to the creation of a new paradigm or field in education.
- Results:
  - Often do not fit within established models or theories
  - May initially be unexpected or difficult to interpret
- Nature and utility **might not be recognized until years later** (high risk, high reward)
Adopted from Booth, Colomb, and Williams, 2009.
Research vs. Development

• STEM education programs emphasize
  ▪ Research
  ▪ Knowledge generation

• Development activities can be part of a project when they are germane to answering specific research questions
Projects should build on available evidence and theory and generate evidence and build knowledge—*they must be knowledge-based and knowledge-generating.*

**Develop and implement/adapt and study**

- Effective, high-quality, curricular and co-curricular activities and professional development
- Activities tailored to students, STEM faculty, and different types of institutional contexts

**Know what’s been done!**

**Use the literature!**

**Inform the community of the results!**
Useful Resource: Common Guidelines for Education Research and Development

- Guidance on building the evidence base in STEM learning.
- Research and development efforts
  - that increase understanding of effective undergraduate STEM teaching and learning
  - provide the foundation for building the STEM workforce of tomorrow and improving scientific literacy.
The submitter’s three jobs

1. Identify the right funding opportunity
2. Conceptualize a fantastic project
3. Write a persuasive proposal in 15 pages
Overview

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(Selected) STEM Education Programs

DUE Programs

- Advanced Technological Education (ATE)
- Improving Undergraduate STEM Education (IUSE: EHR) and IUSE: HSI
- Robert Noyce Teacher Scholarship Program (Noyce)
- Scholarships in Science, Technology, Engineering, and Mathematics Education (S-STEM)
- Research Coordination Networks in Undergraduate Biology Education (RCN-UBE) (with DBI)
Selected STEM Education Programs (cont.)

• HRD Programs
  ▪ Louis Stokes Alliances for Minority Participation (LSAMP)

• EHR-wide Programs
  ▪ EHR Core Research (ECR)
  ▪ Improving Undergraduate STEM Education: Hispanic-Serving Institutions (IUSE: HSI)

• Cross-directorate Programs
  ▪ Faculty Early Career Development (CAREER) Programs
  ▪ Research Experiences for Undergraduates (REU: EHR)
  ▪ Research in Undergraduate Institutions (RUI)/Research Opportunity Awards (ROA)
  ▪ CyberCorps® Scholarship for Service: Defending America’s Cyberspace (SFS)
  ▪ Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining)
  ▪ Cyberlearning for Work and the Human-Technology Frontier (Cyberlearning)
  ▪ Future of Work at the Human-Technology Frontier (FW-HT)
  ▪ Harnessing the Data Revolution: Data Science Corps (HDR: DSC)
  ▪ Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES)
ATE
Advanced Technological Education

Solicitation: NSF 17-568
Due Date: 1st Thursday in October
(3 October 2019)
Advanced Technological Education (ATE)

ATE focuses on the education of technicians to meet workforce demands in existing and emerging advanced technological fields.

Must respond to hiring needs for highly-skilled technical workforce in the service area of the proposing institution(s).

Must address sustainability.

Colleges that award two-year degrees and their faculty must play a leadership role on all projects.

Requires partnerships between two-year colleges and business and industry, along with secondary schools, four-year colleges and universities, and government, as appropriate.
ATE Project Focus Areas

• Program Development and Improvement
• Curriculum and Educational Materials Development
• Professional Development for Educators
• Leadership Capacity Building for Faculty
• Teacher Preparation
• Business and Entrepreneurial Skills Development for Students
• ATE Coordination Networks
• Small Grants for Institutions New to the ATE Program**
• Adaptation and Implementation
• Instrument Acquisition with Curricular Modifications to Support the Instrumentation

See ATE solicitation NSF 17-568 for more details!
Eligibility for an ATE Award

• Proposals may be submitted by:
  ▪ One or more universities, four-year colleges, and/or two-year colleges
  ▪ U.S. nonprofit entities that have established consortia among such institutions of higher education (IHE)
  ▪ Professional societies and similar organizations that are directly associated with educational or research activities

• There are no limits as to who can serve as PI, the number of proposals per organization, or the number of proposals per PI or Co-PI
ATE: Three Program Tracks

Projects

- $75 - $200k, up to 3 yrs except
- Small/new to ATE: $225k
- Adapt & Implement: $300 - $400k
- Instrument acquisition: $400 - $500k

Centers

Targeted Research on Technical Education

- From $150k, up to 2 yrs to $800k, up to 3 yrs

Two Types

Center

- up to $5 million, 5 yrs
- One renewal possible

Resource Center

- up to $600k, 3 yrs
- One renewal possible
IUSE: EHR

Improving Undergraduate STEM Education: Education and Human Resources

Solicitation: NSF 17-590

Due Date Development and Implementation Tier: 2\textsuperscript{nd} Tuesday in December (11 December 2018)

Due Date Exploration and Design Tier: Open Submission Window (no due date)
Improving Undergraduate STEM Education (IUSE: EHR)

- Improve STEM Learning & Learning Environments
- Build the Professional STEM Workforce for Tomorrow
- Broaden Participation & Institutional Capacity for STEM Learning
- Proposals should describe projects that build on available evidence and theory and that will generate evidence and build knowledge.
Competitive proposals are **knowledge-based and knowledge-generating.**

<table>
<thead>
<tr>
<th>Program Goals</th>
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<tbody>
<tr>
<td><strong>Improve STEM Learning and STEM Learning Environments</strong></td>
</tr>
<tr>
<td>Increase the number and diversity of undergraduate students recruited and retained in STEM education and career pathways through improving the evidence base for successful strategies to broaden participation and implementation of the results of this research</td>
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<tr>
<td><strong>Build the Professional STEM Workforce for Tomorrow</strong></td>
</tr>
<tr>
<td>Improve the preparation of undergraduate students so they can succeed as productive members of the future STEM workforce, regardless of career path, and be engaged as members of a STEM-literate society</td>
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<tr>
<td><strong>Broaden Participation and Institutional Capacity for STEM Learning</strong></td>
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Two Program Tracks

**Engaged Student Learning**
Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools

- Two Approaches
  - **Exploration & Design** *(smaller scale)*
    - Up to $300K
    - Up to 3 yrs
  - **Development & Implementation** *(larger scale)*
    - Level I: Up to $600K, Up to 3 yrs
    - Level II: $600K to $2M, Up to 5 yrs

**Institutional and Community Transformation**
Focus on increasing the propagation of highly effective methods of STEM teaching and learning

- Two Approaches
  - **Exploration & Design** *(smaller scale)*
    - Up to $300K
    - Up to 3 yrs
  - **Development & Implementation** *(larger scale)*
    - Up to $3M
    - Up to 5 yrs

**Open Submission Window**

**Due Date:** 11 Dec. 2018
IUSE: Hispanic-Serving Institutions (IUSE: HSI)

- The HSI Program seeks to:
  - Enhance the quality of undergraduate STEM education at HSIs
  - Increase retention and graduation rates of undergraduate students pursuing degrees in STEM fields at HSIs
  - Build capacity at HSIs that typically do not receive high-levels of NSF grant funding
- Projects are expected to be evidence-based as well as generate new knowledge about how to enhance undergraduate STEM education to increase retention and graduation rates of undergraduate students pursuing degrees in STEM fields at HSIs.
- The HSI Program will support activities that:
  - improve STEM learning and learning environments,
  - broaden participation in STEM,
  - build institutional capacity for STEM learning, and/or
  - develop the professional STEM workforce of tomorrow.

Due: the 3rd Wednesday in September
Noyce
Robert Noyce Teacher Scholarship Program

Solicitation: NSF 17-541
Due Date: Last Tuesday in August
(27 August 2019)

**GOAL**: Encourage talented STEM majors and STEM professionals to become K-12 STEM teachers

Scholarship, stipend, and fellowship recipients must teach in a high-need school district for a specified number of years

**Track 1 (S&S) Scholarships & Stipends**
- Undergraduate STEM majors and/or STEM career changers

**Track 2 (TF) NSF Teaching Fellowships**
- STEM career changers

**Track 3 (MTF) NSF Master Teaching Fellowships**
- Exemplary, experienced STEM teachers

**Track 4 (Noyce Research) Research on the preparation, recruitment, and retention of K-12 STEM teachers**
Program Solicitation

Proposals must provide evidence of exemplary teacher preparation and development efforts.

Proposals must provide evidence of genuine collaboration between faculty in STEM and faculty in education.

Every project is expected to be grounded in and contribute to the knowledge base.

Proposal Due Dates

- Aug 28, 2018
- Last Tuesday in August annually thereafter
S-STEM
Scholarships in STEM

Solicitation: NSF 17-527
Due Date: Last Wednesday in March
(27 March 2019)
Mission of the S-STEM Program

• To provide scholarships
  ▪ to academically-talented, low-income students
  ▪ with demonstrated financial need
  ▪ to increase STEM degree attainment
  ▪ to enhance the homegrown STEM workforce
  ▪ ensuring the competitiveness of the US in the global workforce market.
S-STEM Program: Goals

• To increase the recruitment, retention, student success, and graduation (and transfer) of low-income academically talented students in STEM.
• To implement and study models, effective practices, and/or strategies that contribute to success in STEM.
• To contribute to the implementation and sustainability of effective curricular and co-curricular activities in STEM education.
S-STEM Program: Core Ideas

• Enhances the national STEM workforce by increasing
  ▪ # of students who graduate with STEM degrees
  ▪ # of students entering the STEM workforce

• Provides scholarships to students who
  ▪ Have academic promise to succeed in STEM
  ▪ Are low-income with demonstrated financial need

• Funded by H-1(B) visa fees authorized by U.S. Congress transferred to NSF (approximately $100M annually)
NSF Scholarships for STEM (S-STEM) Program
Explores ensuring STEM student success

- Curriculum
  - Development
    - Professional
  - Workforce
  - Cohorts
  - Mentoring, etc.

Curricular & Co-Curricular Activities

- Study & Understand
  - Models
  - Effective practices
  - Strategies

- Recruitment
  - Retention
  - Student success
  - Academic/career pathways
  - Student transfer
  - Degree attainment

Increase

NSF Scholarships for STEM (S-STEM) Program: Explores ensuring STEM student success.
RCN-UBE
Research Coordination Networks in Undergraduate Biology Education

Solicitation: NSF 18-510
Due Date: 3rd Tuesday in January
(21 January 2020)
RCN-UBE Program

• Supports the creation of networks (researchers, educators, other stakeholders) that will collaboratively address some (general) aspect of undergraduate biology education (the theme of the proposal)

• The RCN-UBE program accepts:
  ▪ Full proposals (15 page maximum) – up to $500,000 for up to five years.
  ▪ Incubator proposals (8 page maximum) – up to $75,000 for one year.
    • Meant to support the initial formation of (i.e., “incubate”) a network.
    • A full proposal does not need to be preceded by an Incubator (but many do).
• Most of the budget will go to participant support costs
• A (research) collaboration is not a network.
• RCN-UBE awards do not support existing networks.
• RCN-UBE awards cannot be used to support the research of individual faculty.
Potential Themes (not inclusive or limiting)

• Active learning
• Course-based research experiences
• Incorporating subdisciplines into curricula
• Service learning
• Quantitative reasoning
• Biological literacy
• Assessment
• Transfer success
• Engaging underrepresented students
• Computational thinking
• Professional development
Louis Stokes Alliances for Minority Participation (LSAMP)

- Assists universities and colleges in their efforts to significantly increase the numbers of students matriculating into and successfully completing high quality degree programs in STEM disciplines. Particular emphasis is placed on transforming undergraduate STEM education in support of racial and ethnic groups historically underrepresented in STEM disciplines.

- The LSAMP Program priorities are to:
  - Increase individual student retention and progression to baccalaureate degrees for underrepresented racial and ethnic groups,
  - Enable successful transfer of underrepresented students from 2-year to 4-year institutions in STEM programs,
  - Increase access to high quality undergraduate research experiences, and Facilitate seamless transition of underrepresented students into STEM graduate programs.

Variable due dates depending on project type
EHR Core Research (ECR) Program

Addresses persistent challenges in STEM:
- Learning
- Learning environments
- Workforce development
- Broadening participation

by emphasizing accumulation of robust evidence to inform efforts to:

- Suggest interventions and innovations

Interest
Education
Learning
Participation
Understand
Build theory to explain

Due: 1st Thursday in October
Faculty Early Career Development (CAREER) Program [NSF-wide]

• Prestigious award
• Supports junior faculty early in their independent research careers who exemplify the role of teacher-scholar
• EHR CAREER research may focus on understanding STEM learning and education. EHR programs that accept CAREER proposals include:
  • Improving Undergraduate STEM Education (IUSE)
  • EHR Core Research (ECR)
• Five-year integrated research and education plan, with minimum total budget request of $400K ($500K in BIO, ENG, PLR)

Due: 3rd Wednesday in July (EHR)
Research Experiences for Undergraduates (REU)

- Supports active research participation by undergraduate students
- REU Sites - based on independent proposals to initiate and conduct projects that engage a number of students in research
- REU Supplements may be included as a component of proposals for new or renewal NSF grants or cooperative agreements or may be requested for ongoing NSF-funded research projects

Antarctica: Due 4\textsuperscript{th} Friday in May
Others: Due 4\textsuperscript{th} Wednesday in August
Facilitating Research at Primarily Undergraduate Institutions: RUI and ROA

- Research in Undergraduate Institutions (RUI) and Research Opportunity Awards (ROA) support research by faculty members at PUIs
  - RUIs support PUI faculty in research that engages them in their professional field(s), builds capacity for research at their home institution, and supports the integration of research and undergraduate education.
  - ROAs are similar to RUIs but these awards typically allow faculty to work as visiting scientists at research-intensive organizations where they collaborate with other NSF-supported investigators.
- All NSF directorates may support RUI and ROA funding activities
- Separate allocation: RUIs and ROAs are evaluated and funded by NSF programs in the disciplinary areas of the proposed research and are funded at their discretion
- Submission deadlines vary by program
CyberCorps® Scholarship for Service (SFS)

- The goals of SFS are to develop a superior cybersecurity workforce and align with the U.S. National Cyber Strategy.
- Provides funds for student scholarships in support of education in areas relevant to cybersecurity
  - All scholarship recipients must work after graduation for a federal, state, local, or tribal government organization in a position related to cybersecurity for a period equal to the length of the scholarship.
  - During the scholarship period, students must participate in meaningful summer internships.
  - Students must also participate in other SFS activities such as conferences, workshops, and seminars.

Due: 31 July 2019 and 2020
Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining)

- Seeks to prepare, nurture, and grow the national scientific research workforce for creating, utilizing, and supporting advanced cyberinfrastructure (CI) to enable and potentially transform fundamental science and engineering research and contribute to the Nation's overall economic competitiveness and security.
  - Ensure broad adoption of CI tools, methods, and resources by the research community in order to catalyze major research advances and to enhance researchers’ abilities to lead the development of new CI
  - Integrate core literacy and discipline-appropriate advanced skills in advanced CI as well as computational and data-driven science and engineering into the Nation’s educational curriculum/instructional material fabric spanning undergraduate and graduate courses for advancing fundamental research.
- Pilot and Implementation projects may target one or both of the solicitation goals, while Large-scale Project Conceptualization projects must address both goals.

Due: 3rd Wednesday in January
Cyberlearning for Work at the Human-Technology Frontier (Cyberlearning)

• Goal is to investigate innovative technologies for STEM learning and teaching within the educational and work settings, to include pervasive lifelong learning with technology.

• Supports projects that are exploratory and experimental in nature

• Research in this program should be informed by the convergence of multiple disciplines: education and learning sciences, computer and information science and engineering, and cognitive, behavioral and social sciences.

• Scope of projects span across:
  ▪ Content areas: STEM and other foundational areas supported by NSF
  ▪ Population and context: learners, teachers and workers in formal or informal settings and individual, collective, and collaborative learning across the lifespan

Due: 2nd Monday in January
Future of Work at the Human-Technology Frontier: Core Research (FW-HTF)

• One of NSF’s “Ten Big Ideas”
• Overarching vision is to support convergent research to understand and develop the human-technology partnership, design new technologies to augment human performance, illuminate the emerging socio-technological landscape, understand the risks and benefits of new technologies, understand and influence the impact of artificial intelligence on workers and work, and foster lifelong and pervasive learning.
• A FW-HTF proposal must
  ▪ Focus on advancing fundamental understanding of future work, and potential improvements to work, workplaces, workforce preparation, or work outcomes for workers and society.
  ▪ Be convergent research that addresses the technological as well as the human and societal dimensions and potential impact of future work, and in doing so, make significant contributions to both intellectual merit and broader impact.
Harnessing the Data Revolution (HDR): Data Science Corps (DSC)

• One of NSF’s “Ten Big Ideas”
• HDR is a coordinated set of program solicitations resulting in an ecosystem of interrelated activities enabling
  ▪ Research in the foundations of data science; frameworks, algorithms, and systems for data science; and data-driven research in science and engineering;
  ▪ Advanced cyberinfrastructure
  ▪ Education and workforce development
• DSC focuses on building capacity for harnessing the data revolution at the local, state, national, and international levels to help unleash the power of data in the service of science and society.

Due: January 28, 2019 - February 14, 2019
Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES)

Enhance U.S. leadership in science, technology, engineering, and mathematics (STEM) discoveries and innovations by focusing on broadening participation in these fields at scale.
Tribal Colleges and Universities Program (TCUP)

- Supports the preparation of a science and engineering workforce that is broadly inclusive
- Awards to Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions
- Promotes high-quality STEM education and research
- Three foci, each with multiple project types:
  - Transformative Capacity Building focus
  - Multiple Institution Collaborations
  - Individual Investigator Studies focus