New Developments in the Division of Graduate Education:
A Dialogue Between the Graduate Community and NSF

Susan Brennan, Program Director
(sbrennan@nsf.gov)
Gisele Muller-Parker, Program Director
(gtmuller@nsf.gov)

Moderator: Brian S. Mitchell, CGS/NSF Dean-in-Residence
Northeast Association of Graduate Schools 2016 Annual Conference, Waterloo ON
Goals of presentation

I. **Provide an Overview** of NSF’s current context for graduate education and preparation of the future workforce

II. **Highlight** how NSF (and DGE specifically) is addressing graduate preparedness through changes to its programs

III. **Gather Your Input:** what should NSF be thinking about as we develop new initiatives to support graduate education?
NSF Investment Focus

• *Training* in national STEM priority areas

• *Innovative models* for graduate education with potential for scalability

• *Research knowledge base* to inform improvements in graduate education

• *Professional development* of graduate students for both academic and non-academic careers
NSF Graduate Education Investments
$985.68 M (FY2014 Estimates)

- Fellowships and Scholarships: 36%
- Traineeships: 1%
- Research Assistantships: 60%
- Reform of Graduate Education: 3%
NSF Graduate Education Strategic Plan

To be released in 2016

• Reinforces the critical role of graduate education in the U.S.’s science & engineering research enterprise
• Optimizes NSF investments in graduate education
• Supports the NSF Strategic Plan for 2014-2018 and aligns with the Federal STEM Education 5-Year Strategic Plan
• Targets investments and assesses impact
Dear Colleague Letter: Improving Graduate Student Preparedness for Entering the Workforce, Opportunities for Supplemental Support

April 15, 2016

- Encourage enhanced mentoring & skills beyond academia
- Encourage theory and/or evidence-based strategies to enhance and expand training in essential professional skills
- Enhance interdisciplinary training and collaborations through development of activities that encourage graduate student preparedness for entering the workforce

NSF Priority Goal: FY16-17

STEM Graduate Student Preparedness

Mechanisms

Supplements to Existing Awards

- Single/collaborative awards for existing graduate students to acquire professional development experience
- Larger “center-like” awards to develop new “best practice activities” for preparedness of cohorts of graduate students.

Summer Institutes

- For convincing theory- or evidence-based strategies for providing students with professional development in areas that have been identified as being essential to workforce preparedness.
II. Division of Graduate Education

• Supports U.S. graduate students and innovative graduate programs to prepare tomorrow’s leaders in STEM.

• Provides leadership for the use and conduct of research to inform implementation of approaches, practices, and models for STEM professional workforce development.
Division of Graduate Education Portfolio

Graduate Research Fellowship Program

NSF Research Traineeship Program

CyberCorps® Scholarship for Service

EHR Core Research: Workforce Development

Project and Program Evaluation
Goals and Key Elements

- To select, recognize, and financially support individuals early in their careers who have demonstrated potential to be high achieving scientists and engineers
- To broaden participation in science and engineering of underrepresented groups, including women, minorities, persons with disabilities, and veterans

**GRFP Successes**
- >50,000 Fellows
- 43 Nobel Laureates
- ~450 Members of the National Academy of Sciences
- Higher Ph.D. completion rates overall
- Higher Ph.D. completion rates for women and URM

GRFP Fellows:
Keith Doelling (left) and Teon Brooks (right)
New York University
Fellow Tonya N. Williams

- NSF Fellow at North Carolina (Fiber and Polymer Science Program)
- Her interest in chemistry, color and their applications, paired with an awareness of the toxicological profile of various colorants, has motivated her to pursue a career in green chemistry.

Demographics of current Fellows

<table>
<thead>
<tr>
<th>Gender</th>
<th>%</th>
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<tbody>
<tr>
<td>Women</td>
<td>53%</td>
</tr>
<tr>
<td>Men</td>
<td>46%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
</tbody>
</table>

Credit: Amanda Padbury, North Carolina State University College of Textiles

Celebrating Black History Month with our NSF Fellows:

Change to eligibility for next year’s competition:

• Students already enrolled in graduate school may apply only once, in their 1st or 2nd year
• Those who applied as 1st year graduate students last year (2015) can apply as 2nd year graduate students in 2016
• There are no changes to eligibility for undergraduates, post-baccalaureate, or returning students

RATIONALE:
• Increase success rate for applicants
• Increase diversity of applicant pool and institutions
• Ease workload for applicants, referees, reviewers
• Maximize benefits of receiving the fellowship early

Questions? Contact a GRFP Program Officer
GTMULLER@nsf.gov, JSCHLATT@nsf.gov, EJONES@nsf.gov, or SBRENNAN@nsf.gov
Launched new longitudinal study of career outcomes of Fellows to assess program impact

- Develop and pilot a GRFP survey instrument to assess career outcomes
- Conduct a survey of six cohorts of recent Fellows in 2016 and 2017

**GOALS:**
- Implement a permanent monitoring system for NSF to follow cohorts of Fellows over time.
- Use the data as part of a larger evaluation of the GRFP
Graduate Research Internship Program

Fellows conduct mission-related, collaborative research projects at federal facilities and national laboratories.

Partner Agencies

Department of Homeland Security
Environmental Protection Agency
Federal Bureau of Investigation
National Oceanic and Atmospheric Administration
Office of Naval Research
Smithsonian Institution
U.S. Census Bureau
U.S. Geological Survey
Graduate Research Opportunities Worldwide

Fellows engage in research collaborations with investigators in partner countries through agreements between NSF and counterpart agencies.

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<thead>
<tr>
<th>Partner Countries</th>
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<tbody>
<tr>
<td>Australia</td>
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<tr>
<td>Finland</td>
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<tr>
<td>Japan</td>
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<td>Norway</td>
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<td>Austria</td>
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<td>France</td>
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<td>Korea</td>
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<td>Singapore</td>
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<td>Brazil</td>
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<td>India</td>
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<tr>
<td>Mexico</td>
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<td>Sweden</td>
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<td>Chile</td>
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<td>Ireland</td>
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<tr>
<td>Netherlands</td>
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<tr>
<td>Switzerland</td>
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<tr>
<td>Denmark</td>
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</tbody>
</table>
What are the Benefits to Fellows?

• $5,000 Travel allowance
• Additional in-country support from partner agency
• $5,000 Research allowance
• Additional research support from partner agency

• Access to facilities, data, equipment, field sites
• New collaborations and expanded network
• Skill development and exposure to different cultures (both international and domestic)
Division of Graduate Education Portfolio

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EHR Core Research: Workforce Development

Project and Program Evaluation
NSF Research Traineeship (NRT) Program

NSF 16-503
Research and Capacity Building & Student Support

NRT

- Traineeship
- Innovations in Graduate Education
## How Do the Tracks Differ?

<table>
<thead>
<tr>
<th></th>
<th>Traineeship Track</th>
<th>IGE Track</th>
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<tbody>
<tr>
<td><strong>Primary Aim</strong></td>
<td>Comprehensive graduate student training</td>
<td>Pilot, test, and evaluate targeted new approaches, models and activities</td>
</tr>
<tr>
<td><strong>Interdisciplinary</strong></td>
<td>Yes</td>
<td>Not Required</td>
</tr>
<tr>
<td><strong>Stipend &amp; COE Support:</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Duration/Amount</strong></td>
<td>Up to 5 years; &lt; $3 M</td>
<td>Up to 3 years, $300K-$500K</td>
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<tr>
<td><strong>Limit per Organization</strong></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Eligible Organizations</strong></td>
<td>US Institutions that award research-based master’s and doctoral degrees</td>
<td>All organizations eligible to submit to the NSF</td>
</tr>
</tbody>
</table>
NRT Addresses Graduate Preparedness

• Develops innovative approaches to graduate education for MS and/or PhD students

• Expands/enhances professional development

• Encourages strategic collaborations with stakeholders (e.g., university-industry partnerships)

• Relies on existing evidence of effective practices in STEM education (evidence-based approaches)

• Generates new knowledge that promotes transformative improvements in graduate education
FY 2016 Traineeship Priority Areas

- **Data-Enabled Science & Engineering (DESE)**
- **Innovations at the Nexus of Food, Energy and Water Systems (INFEWS)**
- **Understanding the Brain (UtB)**
- **Other crosscutting, interdisciplinary themes**
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Project and Program Evaluation
CyberCorps®
Scholarship for Service (SFS)

Goals:
• Increase the number of qualified students entering the fields of information assurance and computer security
• Increase the capacity of the US higher education enterprise to continue to produce professionals in these fields to meet the needs of our increasingly technological society
CyberCorps®: Scholarship for Service (SFS)

Scholarship Track
$1-5M/Scholarship grant to colleges and universities

- **Funding**: full tuition, fees plus stipends ($22.5K/$34K per year)
- **Length**: Up to 3-year scholarship for undergraduate or graduate (master’s or doctoral) education
- **Obligation**: Summer internship, post-graduation service requirement (work in Federal/State/Local/Tribal agency equal to scholarship length)
- **Students Eligibility**:
  - U.S. Citizen or Permanent Resident, Enrolled in Cybersecurity program
  - Eligible for Federal employment (must acquire security clearance)

Capacity Building Track
Up to $500K per Capacity Building project

- Supports efforts related to curriculum, outreach, faculty, institutional, and/or partnership development.
# CyberCorps®: Scholarship for Service (SFS)

## Top 10 Placements (SFS Graduates 2009-14)

<table>
<thead>
<tr>
<th>Institution</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Security Agency</td>
<td>120</td>
</tr>
<tr>
<td>US Navy</td>
<td>66</td>
</tr>
<tr>
<td>Mitre Corporation</td>
<td>53</td>
</tr>
<tr>
<td>Department of Homeland Security</td>
<td>50</td>
</tr>
<tr>
<td>Federal Reserve System</td>
<td>35</td>
</tr>
<tr>
<td>State, Local, &amp; Tribal</td>
<td>34</td>
</tr>
<tr>
<td>Sandia Laboratory</td>
<td>32</td>
</tr>
<tr>
<td>Department of Defense</td>
<td>31</td>
</tr>
<tr>
<td>Software Engineering Institute</td>
<td>28</td>
</tr>
<tr>
<td>Central Intelligence Agency</td>
<td>27</td>
</tr>
</tbody>
</table>
Division of Graduate Education Portfolio

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EHR Core Research: Workforce Development

Project and Program Evaluation
Education Core Research

Program Goals

Fundamental Research in Science, Technology, Engineering and Mathematics (STEM) Education

- Provide a coherent foundation of theory and research evidence to guide and improve STEM learning
- Design learning environments
- Gather research evidence to support STEM workforce development
- Broaden participation in STEM education

Program Strands

- STEM Learning/Learning Environments
- Broadening Participation and Institutional Capacity
- STEM Professional Workforce Development

Deadline: September 8, 2016
STEM Professional Workforce Development

- Impact of different funding models on student preparation
- Persistence in STEM majors and careers
- Influence of public/private partnerships on workforce preparation
- Implications of labor market trends on STEM education and training
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EHR Core Research: Workforce Development

Project and Program Evaluation (PPE)
Promoting Research and Innovation in Methodologies for Evaluation (PRIME)

- Supports the development, demonstration, and validation of innovative methodologies and approaches in evaluation of STEM education programs or projects.
- Three types of support:
  - Exploratory projects (proof-of-concept and feasibility studies)
  - Full-scale projects
  - Conferences

Archived Solicitation: 15-540

*PRIME is on hiatus until FY 2017*
NSF Major Investments FY 2016-2017

- NSF Inclusion across the Nation of Communities of Learners that have been Underrepresented for Diversity in Engineering and Science (INCLUDES)

- Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS)

- Understanding the Brain (UtB)

- Risk and Resilience

- CyberCorps®: Scholarship for Service (SFS)

- Graduate Research Fellowship Program

- NSF Innovation Corps (I-Corps)

- NSF Research Traineeship (NRT)
What should NSF be thinking about as we improve our programs and develop new initiatives to support graduate education?
Thank you!

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