

Strategic Initiatives in Graduate Education at the National Science Foundation

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CGS Virtual Summer Workshop, July 14, 2020







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Division of Graduate Education

- Serves as a major focal point for graduate education both inside and beyond the agency
- Supports U.S. graduate (and UG) students and innovative graduate programs to prepare tomorrow's leaders in STEM
 - Direct support of around 20% of graduate students who receive funding from NSF
- Provides leadership for research on graduate education and STEM professional workforce development
- Builds capacity for STEM education research



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Opportunities for graduate education

- Links between graduate education and national prosperity
- Solutions to society's most pressing challenges
- Robust career opportunities for both masters' and doctoral candidates
- Graduate students as the driving force for innovation in universities at all levels and other institution types



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Challenges for graduate education

- Institutional investment required for doctoral education
- Personal costs for graduate students
 - Time-to-degree, attrition, and well-being
- Ensuring a robust group of well-qualified applicants
- Progress towards diversity and inclusion
- Ensuring transparency of career outcomes and preparing students for the full range of employment opportunities
- Increasing the visibility of graduate student contributions

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Vision for graduate education

- Student-centered
- Improved completion rates and shorter time-to-degree
- Greater uniformity of outcomes across institutions
- STEM graduate student body and workforce that reflects all facets of our diverse population
- Comprehensive career development programs for the full range of career opportunities
- Full understanding of student outcomes in a format that is of value both to prospective students and policymakers





DGE programs



Graduate Research Fellowship Program (GRFP) and INTERN



NSF Research Traineeship/Innovations in Graduate Education (NRT/IGE)



EHR Core Research (ECR): Core (Workforce Development) and Broadening Capacity for STEM Education Research (BCSER)



CyberCorps[®] -- Scholarships for Service (SFS) and Secure and Trustworthy Cyberspace (SaTC-EDU)





DGE program leads

GRFP

• Jong-on Hahm - <u>jhahm@nsf.gov</u> – (703) 292 8013

NRT/IGE

• John Weishampel - jweisham@nsf.gov – (703) 292 2162

ECR/BCSER

• Earnestine Easter - <u>eeaster@nsf.gov</u> – (703) 292 8112

SFS/SaTC-EDU

Victor Piotrowski - <u>vpiotrow@nsf.edu</u> – (703) 292 5141





Graduate Research Fellowship Program

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

All NSF areas supported, but focus on priority areas of computationally intensive research, quantum information science, and artificial intelligence



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GRFP

- Five year award \$138,000 per Fellow
 - Three years of support
 - \$34,000 stipend per year
 - \$12,000 Cost of Education allowance to institution
- Career Life Balance (family leave)
- FASED (disability support)
- Professional development opportunities: INTERN (GRIP)







GRFP



- ~ 8,800 active Graduate Research Fellows
- ~500 baccalaureate institutions
- ~270 graduate schools



Active Fellows (2019-20) 56% Women (*54%) 23% URM (*13%) (138 veterans)

* Natl. data: Women, Minorities, and Persons with Disabilities in Science & Engineering -US citizen & perm resident data only

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INTERN – non-academic internships for NSF-supported graduate students

- Open to both GRFP recipients and students supported on research grants
 - Including international students
- Up to \$55K for up to 6 months of internship
- Requires IP agreement
- Broad range of placements
 - Government, non-profits and private sector

Graduate	Internship Host:
Students:	Mentor and
Access real	access a new
world	generation of
immersion	talent
NSF: Catalyze workforce Development	Universities: Build pathways to new/stronger links with industry



DCL: https://www.nsf.gov/pubs/2018/nsf18102/nsf18102.jsp

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INTERN – GRFP eligibility

- As for all INTERN applicants
 - Supported on an active NSF award that will be supplemented
 - Students must have completed at least one year in graduate program
 - Making satisfactory progress towards degree completion
 - Masters or Doctorate

PLUS

- Active Fellow (tenure or reserve) at time of internship
 - Fellows on reserve considered for INTERN stipend
- Institution's GRFP PI submits supplement request (not Fellow, nor Fellow's advisor)
- Fellow's advisor can co-sign PI Letter of Support



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Innovations in Graduate Education (IGE)

Testing innovative approaches to graduate education

Key IGE Goals

Pilot, test, and validate innovative approaches to graduate education



Generate knowledge for evidence-based best practices

Solicitation NSF 17-585 - up to \$500,000 over 3 years (Revised solicitation will be posted late summer with a fall deadline)









• 8 EPSCoR Regions

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NSF Research Traineeship (NRT)

Encouraging the development of innovative models for interdisciplinary/convergent STEM graduate training, including with student support

Key Traineeship Goals

- Interdisciplinary/convergent research
- Institutional change
- Workforce development











NSF Research Traineeship program

High-priority research areas:









NSF Research Traineeship program

Environmental Sci/Resilience/Conservation (11) Ag/Biotech (1) Anti-counterfeiting (1) Environmental OneHealth (1) Polymer Science (1) Bioelectronics (1) Citizen-centered Smart Cities (1) Aeroecology (1)



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NSF Research Traineeship program

Geographic Distribution

- 85 Projects/91 Awards
- 36 States & 1 Territory
 - 25% awards EPSCoR

Awardee Institutions

- 9% MSIs
- 21% non-R1

Awardee PIs

- 34% Female
- 9% URM





Data as of 6/1/20



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ECR/BCSER



- Through the EHR Core Research program, the Directorate for Education and Human Resources supports fundamental research that advances progress with respect to:
 - STEM Learning and Learning Environments
 - Broadening Participation in STEM
 - STEM Workforce Development
- EHR's effort contributes to the Foundation's mission and goal for advancing research as outlined in the NSF Strategic Plan, <u>Building the</u> <u>Future: Investing in Discovery and Innovation - NSF Strategic Plan for</u> <u>Fiscal Years (FY) 2018 - 2022</u>
- ECR's Building Capacity for STEM Education Research program builds individuals' capacity to carry out high-quality fundamental STEM education research

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BCSER – relevant capacity-building foci

- Deep knowledge of subject-matter literature
- Multidisciplinary perspectives
- Expertise in study design, research methods, and data analysis
- Research that advances educational innovation
- Skills synthesizing study findings
- Experience collecting, managing, documenting, and archiving data
- Experience building teams, establishing partnerships, leading collaborations, and mentoring junior collaborators



Program Solicitation
NSF 20-521

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CyberCorps[®]: Scholarship for Service (SFS) program

SUPPORT

- Funding: full tuition plus stipends \$25K/\$34K and professional development \$6K per year, up to 3 years
- **Obligation:** Summer internship and post-graduation service requirement (work in a government agency for a period equal to the scholarship length)

IMPACT

- As of January 2020, 4,040 SFS scholarship recipients
- 2,834 entered government service
- Placed in **357** government organizations
- 800+ in the academic phase
- **340+** graduated in May 2020
- B.S. (35%), M.S. (62%), Ph.D. (3%)
- Female (25%) (2013-2018)
- Placement rate **95%**



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CyberCorps[®] SFS Academic Institutions

States without Institutions

87 Scholarship for Service Participating Institutions in 37 states + District of Columbia and Commonwealth of Puerto Rico



PR





SFS Top Placements



Post-Graduation Agency	Number
National Security Agency (NSA)	600
Department of Navy	271
MITRE managed FFRDCs	225
State/Local/Tribal Government	191
Department of the Army	153
Department of Homeland Security	125
Sandia National Laboratories	123
Department of Defense	104
Department of Justice	81
John Hopkins Applied Physics Laboratory	76
Department of Air Force	74
Central Intelligence Agency (CIA)	66





SaTC-EDU

- Capacity-building for cybersecurity education and education research
 - Improved teaching methods, including in K-12 setting
 - Integration of research and cybersecurity education programs
 - Institutional collaborations between community colleges and fouryear institutions
 - Evaluate impact of new or existing curricula on learning
 - Participation of a broad and diverse population in cybersecurity education and workforce
- Total budget of up to \$400,000 over three years



PROGRAM SOLICITATION NSF 19-603

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EHR and the CAREER program

- EHR in general, and DGE specifically, eager to receive applications for the CAREER program
- Proposal deadline is typically the fourth Monday in July
 - 2020 deadline has been extended to August 11
- FAQ's posted as NSF 20-025; a webinar with application tips is also available
- DGE contact is Program Officer Vinod Lohani
 - <u>vlohani@nsf.gov</u>; (703) 292 2330



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NSF/EHR/DGE response to COVID-19

- CARES Act funding used to support almost 500 RAPID/EAGER awards
 - \$5M allocated to EHR; four awards in DGE
 - RAPID awards continue to be supported from program funds
- Implementation guidance provided to grantees regarding OMB authorities on allowability of costs through 9/30/20
 - Allowability of salaries defer to institutional policies
 - Allowability of costs such as cancelled travel and conferences
 - Supplements to existing awards to fulfill original aims being considered on a case-by-case basis
- Additional responses actively being considered
 - Contingent on additional budget allocations



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DGE-funded RAPID awards*

 RAPID: Understanding Graduate Student Experiences of **Support and Stress During the COVID-19 Pandemic** (#2030313, PI: Craig Ogilvie, Montana State University)

The project is a multi-institution, two-phase mixed methods study of graduate students' experiences during the COVID-19 pandemic, their perceptions of institutional support, and near-term impact of this support on educational and career decision-making.

 RAPID: Collaborative Research: Electronic Mentoring to **Address Challenges in Engineering Graduate Programs** During the COVID-19 Pandemic (#2031066, PI: Guan Saw, UT Austin)

The study investigates the life and work challenges for engineering graduate students affected by the COVID-19 outbreak and ementoring attitudes, support, and practices at U.S. institutions.

*An additional award to CGS to study pandemic effects on URM students has recently been made with funding from the BCSER program

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DGE-funded RAPID awards

 RAPID: Ensuring the Success and Sustainability of STEM Graduate Students and Graduate Academic/Research Programs in Response to COVID-19 (#2030148, PI: Debra Stewart, NORC)

The survey will focus on impacts and innovations across three key areas:

- (1) graduate student academic and research progress;
- (2) graduate student health and well-being
- (3) graduate program continuity and sustainability.

It will document novel and effective solutions developed in real-time during the pandemic.

• RAPID: Investigating the impact of online internships in the midst of the COVID-19 pandemic (#2032122, PI: Matthew Hora, University of Wisconsin, Madison)

The project will examine the following research questions:

- (1) What are the demographic characteristics of past and current online interns?
- (2) What types of tasks and mentoring are experienced by online interns?
- (3) What is the impact of an online internship on student career and academic development, professional networks, and transferable skills?
- (4) What are the prospects for online internships to adopt innovations in virtual simulations to enhance the internship experience?

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NSF Strategic Framework for Investments in Graduate Education (FY2016-FY2020)

Advance Science and Engineering (S&E) Research

Support graduate students and graduate education to enable long-term contributions of new knowledge at the frontiers of science and engineering.

• Broaden Participation to Promote Excellence in Research and Build the Next Generation STEM Workforce

> Recruit graduate students from a variety of geographic, demographic, social, and educational backgrounds to promote the advancement of science and a highly qualified professional workforce

 Build Effective Models of Graduate Education and Workforce Development

Support the development and use of innovative models and evidence-based approaches in graduate education, including education and research about promising practices and program effectiveness.

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Research needed *about* graduate education

- Innovative models of education that:
 - Shorten time-to-degree
 - Increase retention
 - Encourage diversity, equity and inclusion
 - Prepare students for the full range of career opportunities
- Return on investments in graduate education
 - Both at the individual and national levels
- Non-academic employer perceptions of the value of graduate education and the unique role of doctoral graduates
- Detailed understanding of pathways through STEM education and into careers
 - Especially for recipients of NSF awards



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Community input

- What are the **critical needs for graduate student support** that NSF can provide?
- How can we best disseminate best practices and lessons learned from the NRT and IGE programs, and build a community of practice?
- What are the critical questions for a STEM graduate education research agenda?
- How can we grow a cadre of STEM graduate education researchers?

THANK YOU!



Thank You!

We will reconvene tomorrow at 1:00 PM EST



