

SELECTED CROSSCUTTING PROGRAMS

Many investments at NSF draw on interdisciplinary teams from across the Foundation and are supported by multiple directorates. Other parts of this chapter, NSF-Wide Investments, provide narratives for NSF-wide priority investments such as Cyber-enabled Materials, Manufacturing, and Smart Systems (CEMMSS); Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS); and Understanding the Brain (UtB). Additional cross-cutting programs at NSF are presented in the narrative below, and full funding data for these programs is provided in the Summary Tables chapter.

ADVANCE

In FY 2016, ADVANCE will fund transformative efforts to address the systemic barriers to women's full participation in academic science, technology, engineering, and mathematics (STEM) careers with funding of \$14.90 million, unchanged from the FY 2015 Estimate. A major focus in FY 2016 will be broadening the spectrum of institutions participating in the program to include more undergraduate and minority serving institutions and community colleges. This focus aims to increase the participation and advancement of women across higher education in academic science and engineering careers. Funding support for ADVANCE in FY 2016 is provided by the Directorates for Biological Sciences (BIO); Computer and Information Science and Engineering (CISE); Education and Human Resources (EHR); Engineering (ENG); Geosciences (GEO); Mathematical and Physical Sciences (MPS); and Social, Behavioral, and Economic Sciences (SBE).

Cultivating Cultures for Ethical STEM (CCE STEM)

NSF's FY 2016 Request provides \$1.90 million for CCE STEM, \$640,000 below the FY 2015 Estimate. The CCE STEM program fosters ethical STEM research in all of the fields of science and engineering that NSF supports, including within interdisciplinary, inter-institutional, and international contexts. CCE STEM research projects use basic research to produce knowledge about what constitutes responsible or irresponsible, just or unjust scientific practices and sociotechnical systems, and how to best instill students with this knowledge. This program builds on NSF's prior support for ethics-related research and program development, most recently Ethics Education in Science and Engineering. Funding for CCE STEM is provided by CISE, ENG, GEO, SBE, and Integrative Activities (IA).

Enhancing Access to the Radio Spectrum (EARS)

NSF's FY 2016 Request provides \$21.0 million for EARS, a decrease of \$2.0 million from the FY 2015 Estimate. EARS' purpose is to fund interdisciplinary research that can enhance the efficiency with which radio spectrum is used, and/or lead to improved access to wireless services for all Americans. The EARS program is responsive to the 2010 NSF-supported workshop report, *Enhanced Access to the Radio Spectrum: A Path Forward*,¹ and to the 2010 National Research Council report, *Spectrum Management for Science in the 21st Century*.² Both of these reports highlighted the need for research on new and innovative ways to utilize the spectrum more efficiently. EARS is a collaboration among CISE, ENG, and MPS.

Faculty Early Career Development (CAREER)

The FY 2016 Request provides \$232.49 million for the CAREER program, an increase of \$9.61 million over the FY 2015 Estimate. This will support approximately 400 new CAREER awards, which support exceptionally promising college and university junior faculty who are committed to the integration of research and education and who are most likely to become the leaders in their fields. All R&RA directorates participate in the CAREER program.

¹ www.nsf.gov/mps/ast/nsf_ears_workshop_2010_final_report.pdf

² www.nap.edu/openbook.php?record_id=12800

Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)

The FY 2016 Request includes \$28.05 million for INSPIRE, unchanged from the FY 2015 Estimate. INSPIRE was established in FY 2012 to encourage and support bold, potentially transformative (PTR) interdisciplinary research (IDR) that transcends typical programmatic scope. It responds to issues raised in a variety of external and internal publications, including National Academies³ and National Science Board⁴ reports and documents relating to the America COMPETES Reauthorization Act of 2010. These reports identified barriers to interdisciplinary research and discussed perceptions in the research community that NSF does not always provide adequate opportunities for unsolicited PTR/IDR proposals that cross traditional boundaries. INSPIRE provides NSF with a funding mechanism that addresses the FY 2012 PCAST⁵ recommendations to adopt a diverse set of mechanisms to optimize a portfolio of awards that includes projects with significant impact and that fall outside of traditional disciplines. In FY 2016, INSPIRE will support approximately 25 new up-to-\$1.0-million awards. Additionally, NSF will investigate opportunities for interagency partnerships. All directorates participate in INSPIRE, with additional funding provided through the IA budget line.

Long-Term Ecological Research (LTER)

The FY 2016 Request provides \$27.95 million, an increase of \$360,000 above the FY 2015 Estimate. LTER supports fundamental ecological research that requires data collection over long time periods and often at large spatial scales. This program supports a loosely coordinated network of more than two dozen field sites that focus on: 1) understanding ecological phenomena that occur over long temporal and broad spatial scales; 2) creating a legacy of well-designed, long-term ecological experiments; 3) conducting major syntheses and theoretical efforts; and 4) providing information to identify and to address environmental problems. LTER projects represent a diversity of habitats in continental North America, the Caribbean, Pacific Ocean, and the Antarctic, including coral reefs, arid grasslands, estuaries, lakes, prairies, forests, alpine and Arctic tundra, urban areas, and agroecosystems. The increased support for LTER in FY 2016 will be used to stimulate new research activities, such as examining evolutionary change in populations and communities that have been studied for over 30 years and syntheses of long-term data using contemporary modeling methods. Funding for LTER is provided by BIO, GEO, and SBE.

National Ecological Observatory Network (NEON) infrastructure will be co-located at eleven LTER sites. NEON is a continental-scale infrastructure facility providing standardized physical and data resources to researchers and educators. LTER is a network of long-term research projects aimed at understanding ecological processes in a wide range of ecosystems. Ongoing research at LTER sites may take advantage of data generated using NEON infrastructure. In addition, the co-location of NEON infrastructure at LTER sites will stimulate new research that builds on the long history of LTER research by enhancing the ability to extend site-based knowledge to regional and continental scales. For more information on NEON, see the NEON narrative in the Major Research Equipment and Facilities Construction chapter.

³ Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy (2004). *Facilitating interdisciplinary research*. National Academies. Washington: National Academy Press.

⁴Enhancing Support of Transformative Research at the National Science Foundation
www.nsf.gov/nsb/documents/2007/tr_report.pdf

⁵ President's Council of Advisors on Science and Technology, *Transformation and Opportunity: The Future of the U.S. Research Enterprise*, www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_future_research_enterprise_20121130.pdf (2012).

Research Experiences for Undergraduates (REU)

In FY 2016, \$77.60 million in funding is requested for the REU Sites and Supplements program, an increase of \$4.40 million above the FY 2015 Estimate. NSF's ongoing support for REU reflects the importance of undergraduate research experiences in building students' interest and competence in STEM disciplines, and aligns with the Administration's focus on improving undergraduate STEM education. REU grants involve students at all stages of undergraduate education. REU Supplements allow students to join research projects that are supported by NSF research grants. REU Sites support cohorts of students to conduct research within STEM disciplines or on topics that cut across disciplines. Most of the students in an REU Site come from outside the host institution. This feature enables the program to involve students in research who might not otherwise have the opportunity, particularly students from institutions where research activities are limited. The REU program encourages partnerships between community colleges and baccalaureate degree-granting institutions to provide research opportunities for community college STEM students and faculty. Starting in FY 2015, NSF's REU Sites and Supplements programs fall within the IUSE purview, with budget and award decisions remaining within individual directorates. Funding for REU is provided by BIO, CISE, ENG, GEO, MPS, and SBE.

Research in Undergraduate Institutions (RUI)

The FY 2016 Request for NSF's RUI program totals \$39.15 million, or \$450,000 below the FY 2015 Estimate. The RUI activity supports research by faculty members of predominantly undergraduate institutions through the funding of 1) individual and collaborative research projects, 2) the purchase of shared-use research instrumentation, and 3) Research Opportunity Awards for work with NSF-supported investigators at other institutions. Funding for RUI is provided by BIO, CISE, GEO, MPS, and SBE.