

FY 2010 Appropriations for the National Science Foundation (NSF)

NSF FY 2010 Request

(numbers are in millions)

NSF	FY09 Estimate	President's FY 2010 Request	% change FY09 vs. FY10 Req.	House	% change House vs. FY09	Senate	% change Senate vs. FY09	Final	% change FY09 vs. FY10
Research & Related Activities:									
Biological Sciences	655.8	733.0	11.8%						
Computer & Information Science & Engineering (CISE)	573.7	633.0	10.3%						
Engineering	574.1	632.0	10.1%						
Geosciences (GEO)	807.1	909.0	12.6%						
Earth Sciences	171.0	186.8	9.3%						
Ocean Sciences	330.3	359.1	8.7%						
Atmospheric and Geospace Sciences	244.6	269.1	10.6%						
<i>NCAR</i>	106.9	100.0	-6.4%						
Integrative & Collab. Education and Research	61.2	93.9	53.5						
Mathematical & Physical Sciences (MPS)	1,255.9	1,380.0	9.9%						
Astronomical Sciences	228.6	250.8	9.7%						
Office of Cyberinfrastructure	199.3	219.0	18.3%						
Social, Behavioral & Economic Sciences	240.3	257.0	6.9%						
Office of Polar Programs	470.7	516.0	9.6%						
Integrative Activities	241.3	271.1	12.3%						
Major Research Instrumentation	100.0	100.0	flat	0.0*	-100.0%	100.0	flat	NSF's discretion	
Total, Research & Related Activities	5,183.0	5,733.0	10.6%	5,642.1	9.0%	5,618.0	8.4%	5,617.9	8.4%**
Education & Human Resources	845.3	857.8	1.5%	862.9	2.0%	857.8	1.5%	872.7***	3.2%
Major Research Equip. & Facilities Construction	152.0	117.3	-22.8%	114.3	-24.8%	122.3	-19.7%	117.3	-22.8%
TOTAL, NSF	6,500.0	7,045.0	8.4%	6,936.5	7.0%	6,916.7	6.4%	6,926.5	6.6%

* funding for the MRI account will resume in FY11 (following FY09 awards of ~\$400M)

** This increase doesn't deduct \$54 million the conferees direct NSF to transfer to USGS for icebreaking services.

R&RA is up 7.3% over FY09 when this is accounted for.

*** The increase, as directed by the conferees, is focused on Discovery Research K-12 programs, Research & Evaluation on Education in Science and Engineering, and Course, Curriculum & Laboratory Improvement program.

Education and Human Resources:

Program	FY 2009 Estimate	FY 2010 Request	% change FY09 vs. FY10 Request	House	Senate	Final
Research on Learning in Formal & Informal Settings	226.5	229.5	1.3%	254.5	229.5	1.3%
Undergraduate Education	283.2	289.9	2.4%	300.2	289.9	2.4%
NSDL	16.5	16.25	-1.5%	16.25	16.25	-1.5%
Math & Science Partnerships Program	61.0	58.2	-4.6%	60.9	58.2	-4.6%
Graduate Education	181.5	181.4	flat	181.4	181.4	flat
Human Resource Development	154.0	156.9	1.9%	158.3	156.9	1.9%
Historically Black Colleges and Universities Undergraduates Program	31.5	32.0	1.6%	33.4	32.0	1.6%

Major Research Equipment and Facilities Construction (MREFC) Account:

Project	FY 2009 Estimate	FY 2010 Request	House	Senate	Final
Ongoing Projects					
Atacama Large Millimeter Array (ALMA)	82.25	42.7	42.7	42.7	42.7
IceCube Neutrino Detector	11.3	0.95	0.95	0.95	0.95
Advanced Laser Interferometer Gravitational Wave Observatory (AdvLIGO)	51.4	46.3	46.3	46.3	46.3
Advanced Technology Solar Telescope	7.0	10.0	10.0	15.0	13.0
Ocean Observatories Initiative	--	14.3	14.3	14.3	14.3

Highlights from the [Conference Report \(12-10-09\)](#):

Yesterday, Congress unveiled a \$446.8 billion Consolidated Appropriations bill which contains six of the seven remaining fiscal year (FY) 2010 spending bills.

The bill provides the National Science Foundation (NSF) with \$6.93 billion for FY 2010, which is 6.7 percent (\$436 million) above the FY 2009 level, excluding ARRA funding, and \$118 million below the President's budget request level. Overall, research programs received significantly greater increases than education programs.

The 6.7 percent increase continues and is consistent with the ongoing initiative to double NSF funding between FY 2006 and FY 2016. In the bill, Congress expresses support for this initiative and concern that NSF budget documents have indicated that in FY 2011 the President will only propose a 3 percent increase for the agency, while Congress believes that request should include a 7 percent increase for NSF.

Research and Related Activities: The Consolidated Appropriations bill includes \$5.62 billion for Research and Related Activities, the account that funds the NSF disciplinary research programs. This is an increase of 8.4 percent, or \$435 million, over FY 2009, but \$115 million below the requested level. Congress does not provide specific allocations for the individual research directorates, but does provide direction on key NSF-wide initiatives. Congressional instruction to NSF includes:

- Endorsement of the proposed \$197 million increase that would expand climate change research at NSF. (NSF is expected to release a broad solicitation in this area as soon as the FY 2010 bill is signed.)
- Increased funding for the Graduate Research Fellowship program, \$14 million over the request, which will allow NSF to make 2,000 new fellowship awards (rather than the planned 1,654) in FY 2010.
- Direction to provide the requested funding levels for the Experimental Program to Stimulate Competitive Research (EPSCoR, \$147 million), the National Radio Astronomy Observatory (\$67 million), and a variety of cross-NSF initiatives, including Cyber-Enabled Discovery and Innovation (\$103 million) and Science and Engineering Beyond Moore's Law (\$47 million).
- Support for NSF's plans to dedicate at least \$2 million in each research division to explore methodologies that support transformative research.

An area of concern for the research community had been the House's direction to NSF to not hold a Major Research Instrumentation (MRI) competition in FY 2010 (since two were held in FY 2009 due to ARRA), but the final bill leaves the decision on FY 2010 MRI funding level and competition to NSF's discretion.

Education and Human Resources: The Consolidated Appropriations bill provides \$872.8 million for the Education and Human Resources directorate, an increase of 3.3 percent, or \$27.5 million, over its FY 2009 level. This is \$15 million over the requested level, with the additional funds to be distributed as follows:

- An additional \$10 million above the request for the Discovery Research K-12 program, bringing the total to \$119 million.
- An additional \$2.5 million above the request for the Research and Evaluation on Education in Science and Engineering program, bringing the total to \$45.5 million.
- An additional \$2.5 million above the request for the Course, Curriculum, and Laboratory Improvement program.

No funding is provided for FY 2010 to the Professional Science Masters program, established with \$15 million from ARRA in FY 2009.

Other Accounts: The remainder of the NSF funding goes to Agency Operations and Award Management (\$300 million), the Office of the Inspector General (\$14 million), and the National Science Board (\$4.5 million). As in past years, Congress provides much less than the requested increase in Agency Operations and Award Management funds, although it does direct NSF to improve grant management and accountability.

Excerpts from the Senate Committee Report (6-25-09):

Within R&RA, the Senate directs NSF to transfer \$54 million to the Coast Guard for icebreaking activities.

Severe Storm Research.—The Committee recognizes the collaborative efforts between NSF and NOAA to study tornadoes with the research project VORTEX2. This project is scheduled to continue through June 2010. At this time the study only focuses on storms that occur in the Midwestern United States. However, NOAA data shows that more damage is caused by severe weather in the Southeastern portion of the United States than any other region of the country. The Committee directs NSF to take into account this information and to incorporate tornado activity in the Southeastern United States as part of the collaboration with NOAA on this research.

Notes and Excerpts from the House Committee Report (6-9-09):

The committee's reduction recommended for R&RA will enable "increases in important research and education funding in NOAA and NASA."

The committee supports all requested increases for climate change in the various research programs.

"Hydrology and terrestrial ecosystems research.-The Committee notes the success of the National Center for Atmospheric Research in serving as an institutional focus for atmospheric research and in the provision of shared infrastructure, especially supercomputing and the community climate model. The Committee sees the need for an appropriate mechanism to bring together the hydrology research community and better integrate the different types of data and observing systems and enhance support of hydrology modeling."

"Experiential learning.-The Committee strongly believes that students need to have experience doing science and not merely reading about it. Half a century ago an advantage of U.S. science education was the inclusion of laboratory work in high school and college science courses. Today, this type of practical student experience needs to extend beyond reproducing standard experiments to taking measurements where the correct result is not already known. Furthermore, it should extend beyond the four walls of a physics, chemistry, or biology lab. Opportunities for scientific measurement are all around us in the ever changing natural world and are simple enough to be accessible even to elementary school students with affordable equipment such as thermometers. Such hands-on measurement experiences are the central element of inquiry-based instruction where students "do" science: formulating research questions, taking measurements, analyzing data using their mathematics skills, and articulating their results. It is critical that hands-on, inquiry-based instruction form the basis of student learning because addressing the complexity and uncertainty inherent in current real world problems requires the integrated application of all the sciences and mathematics and research shows that this improves student achievement and retention. Science literacy for the general public and future innovation workforce relies on students doing and thinking of how to apply science and math together from their earliest years. Accordingly, the Committee recommendation provides an increase of \$30,000,000 above the request to enhance research, implementation and evaluation of inquiry-based, hands-on instruction for K-12 science students and those who will teach them."

More Detail on President's FY 2010 Request (May 11, 2009):

The National Science Foundation (NSF) would receive \$7.045 billion in the FY 2010 budget request, an increase of \$555 million or 8.4 percent above the FY 2009 appropriated level. This increase builds on a 7.6 percent increase NSF received in FY 2009, and the rate of growth is consistent with the Administration's stated goal to complete a doubling of NSF by 2016. (None of these numbers include

the one-time infusion of \$3 billion to NSF from the American Recovery and Reinvestment Act [ARRA].)

One new Geo Directorate-wide priority in the budget request is \$46 million to go toward a new climate change effort. The major themes under consideration for the program are: forecasting thresholds in environmental changes; balancing the carbon budget; expanding observational and modeling capabilities for water, ice, and ecosystems; understanding the impact of ocean acidification, and developing new energy-efficient computing and networking capabilities and other infrastructure for climate research. The long-term goal of this program is to assert U.S. leadership in understanding the causes and consequences of climate change and develop effective strategies to respond to it.

Research and Related Activities (R&RA)

The NSF Research and Related Activities (R&RA) account would receive \$5.733 billion in the FY 2010 budget request, an increase of \$550 million or 10.6 percent above the FY 2009 appropriated level. The R&RA account includes funding for research in Biological Sciences; Computer and Information Sciences and Engineering; Engineering; Geosciences; Mathematical and Physical Sciences; and Social, Behavioral and Economic Sciences. It also contains funding for cyberinfrastructure, polar research, international activities, and some agency-wide programs, such as the Major Research Instrumentation program and the Experimental Program to Stimulate Competitive Research (EPSCoR).

A complete breakdown of the NSF R&RA budget by division and program is not yet available, but a comparison between the FY 2010 request and the FY 2008 level by directorate is possible. (Data separating the regular FY 2009 and ARRA funding for each directorate in FY 2009 has not yet been provided by NSF.) Proposed funding increases appear to be spread relatively equally—the six major research directorates and the Office of Cyberinfrastructure all would grow between 17.8 percent (Mathematical and Physical Sciences) and 19.9 percent (Geosciences) over the two year period from FY 2008 to FY 2010.

While program-level detail is not available, NSF's plans to support the major priorities of the Administration have been emphasized in several areas by staff from NSF and the White House Office of Science and Technology Policy.

- NSF would increase support for climate research by approximately \$200 million across all fields of science and engineering, including the social sciences. Example areas of focus would include ecosystems vulnerabilities, the carbon cycle, ocean acidification, abrupt climate change, and adaptation and mitigation of climate change.
- NSF also plans to continue and expand its basic research programs that support work to overcome barriers to the use of clean energy.
- NSF will support work on computational models, simulation, and software development to open new pathways in all science and engineering fields.
- The emphasis placed by NSF for its ARRA funds on high-risk transformative research and support for early career investigators, especially through the CAREER program, is proposed to continue in the FY 2010 budget.

Education and Human Resources (EHR)

The NSF Education and Human Resources (EHR) account would receive \$857.8 million in the FY 2010 budget request, an increase of \$12.5 million or 1.5 percent above the FY 2009 appropriated level, excluding ARRA funds. In past years, proposed EHR increases have usually been lower than the

increases proposed for the R&RA account (comparing percentages), but Congress often increases the EHR funding levels during the appropriations process.

In public briefings, NSF leadership has emphasized that education programs at NSF are not limited to EHR, and noted that many of the proposed increases for education in fact occur in the R&RA account. Documents from the White House Office of Science and Technology Policy state that science, technology, engineering, and mathematics education funding NSF-wide would increase by \$43 million, or 4.0 percent from FY 2009 to \$1.109 billion FY 2010.

A complete breakdown of the NSF EHR budget by program is not yet available, but NSF's plan to support major priorities of the Administration have been emphasized.

- In FY 2010, NSF would establish a climate change education program that would support programs for K-12 up to graduate level and efforts to increase public understanding of climate change and its consequences.
- The budget request would begin to grow the Graduate Research Fellowship (GRF) program at NSF, consistent with the President's plan to triple the number of new GRFs, bringing the level to 3,000 by 2013. In FY 2010, the GRF program, which is funded in EHR and across the research directorates in R&RA, would receive \$122 million, enough for 400 additional fellowships, bringing the level to 1600.
- Within EHR, \$64 million, an increase of \$12 million, would be provided for the Advanced Technology Education (ATE) program, to support community college programs focused on training a workforce for high-technology sectors.

Finally, NSF would also join with DOE and other agencies in a clean energy education initiative to inspire and enable students to pursue careers in science, engineering, and entrepreneurship related to clean energy. Earlier press releases from NSF indicate that this effort would include:

- Energy research opportunities for undergraduates.
- Partnerships between industry and two-year and four-year colleges to strengthen education for technicians in the clean energy sector, focusing on curriculum development, teacher training, and career pathways from high schools to community colleges.
- Interdisciplinary energy graduate programs at the master's and Ph.D. level that integrate science, engineering, entrepreneurship, and public policy.
- Individual fellowships to graduate students and postdoctoral researchers involved in the frontiers of clean energy research.
- Study of how students learn about science and technology to enable enhanced learning in the K-12 setting on topics relating to clean energy and development and evaluation of innovative technology experiences for students and their teachers.
- Education in conducting computationally-enabled modeling and analyses of complex interrelationships among energy systems, environmental and economic impacts, and human factors.

At NSF, this initiative would include use of existing programs, such as Graduate Research Fellowship Program, the Integrative Graduate Education and Research Traineeship Program, Research Experiences for Undergraduates, and the Advanced Technological Education Program.

Major Research Equipment and Facilities Construction (MREFC)

The NSF Major Research Equipment and Facilities Construction (MREFC) account would receive \$117.3 million in the FY 2010 budget request, a decrease of \$34.7 million or 22.8 percent below the FY 2009 appropriated level. The lower total reflects the use of ARRA funds for several new and

ongoing MREFC projects, including the Alaska Region Research Vessel, thereby reducing the amount of MREFC spending that would be needed in regular FY 2010 appropriations. The complete budget materials for NSF are not yet available on line.

Detail on President's FY 2010 Request (March 2, 2009):

On February 26, President Obama released his preliminary FY 2010 budget request, which only unveiled numbers for programs at their highest levels. The NSF request for FY10 is \$7.0 billion, a 2.1 percent increase over the House and Senate levels for FY09 (note: these numbers are not final). This reflects a 16 percent increase over FY 2008.

Overall, the top line funding details for research and education are promising and build upon the increases provided by the American Recovery and Reinvestment Act (stimulus legislation) and the pending FY 2009 Omnibus Appropriations bill. The information released, in most cases, does not include information regarding specific programs, but only top line numbers and priority areas for agencies. Additional details about the FY 2010 budget are expected to be unveiled in April. Below are NSF priorities listed in the Administration's budget preview.

- Would provide a doubling of basic research over ten years (\$9.7 billion by FY 2014)
- Would expand support for Advanced Technological Education and the education of technicians
- Would expand support for Faculty Early Career Development programs and graduate research fellowships
- Would establish a climate change education program