National Science Foundation
FY 2009 Budget Request to Congress
Summary of Major Changes by Account

(Dollars in Millions)

NSF FY 2008 Estimate **$6,065**

Research and Related Activities

Biological Sciences **+63**

Funding increases for disciplinary and interdisciplinary research across all core programs. Support is provided for the new BIO investment, Life in Transition as well as for the NSF-wide investments in Adaptive Systems Technology (AST) and Dynamics of Water Processes in the Environment. Continued support is provided for the Plant Genome Research Program. The Center for Research at the Interface of the Mathematical and Biological Sciences will be established and enhanced support will be directed to the Center for Environmental Implications of Nanotechnology. BIO is requesting a realignment of two activities in FY 2009. The first will move Plant Genome Research as a new program line under the Integrative Organismal Systems (IOS) subactivity. The second move will transfer management and oversight of NEON to the Emerging Frontiers (EF) subactivity.

Computer and Information Science and Engineering **+104**

Investments increase in core and emerging areas that emphasize transformative work including the exploration of revolutionary computational models, languages, and tools, and hardware and software architectures; transformative research on trustworthy software and networked systems; and exploration of human-centered computing and information and intelligent systems that promise value to a diverse range of individuals and to society at large. CISE will invest in cybersecurity research and education, with emphases on research in usability, theoretical foundations, and privacy. Enhanced investment in CDI will allow for multidisciplinary projects that emphasize the application of computational thinking and algorithmic insights across all areas supported by NSF. Research in AST will support new directions in which the robustness and adaptive capability of biological organisms inform the problems and approaches taken within CISE research. Through investments in SEBML, CISE will explore new computing paradigms, including bio-inspired and quantum computing.

Engineering **+122**

ENG's core represents a broad and synergistic convergence of fields, disciplines, and frontier opportunities. Increases in FY 2009 focus on multidisciplinary, cutting-edge, and high-impact research. ENG will also support simulation-based engineering and science, a crucial and far-reaching capability enabled by cyberinfrastructure. As cyber-enabled discovery advances, so too must the use of it, such as multiscale modeling, sensor systems, simulation, and integration of large data sets which will allow for predictive decision-making. ENG research in nanomanufacturing, photonics, and micro- and nanoelectronics will result in the new materials and devices—such as microelectronics that exploit properties at the quantum level—required to realize computing capacity beyond the limits suggested by Moore's Law. ENG will support the NSF-wide AST investment, particularly in the area of neural engineering. This field promises to develop techniques and systems that will enable new understanding of the brain, nervous system, and other crucial processes in the body.

Geosciences **+96**

Support increases for investments in fundamental research, particularly in areas such as innovation, understanding global and regional environmental issues, natural disasters, and improving the future quality of life. GEO will support highly meritorious proposals addressing both the near-term and long-term priorities articulated in the Ocean Research Priorities Plan. Increased funding will be directed to the NSF-wide investment in CDI and support will be provided for the new investment in Water. Enhanced support for the Academic Research Fleet will support ship operations and a number of enhancements to the academic fleet. Support will be provided for operation of EarthScope, IRIS, NCAR, Ocean Drilling activities and activities to prepare for the Ocean Observatories Initiative. Support for community instruments and databases, including the University Navstar Consortium (UNAVCO), a number of radar facilities to study processes in the upper atmosphere, and many small instruments supported for research community use will also be increased.

Mathematical and Physical Sciences **+235**

Increased support for CDI will allow for essential research on modeling, algorithms, software, and simulation. Funding for SEBML will support interdisciplinary research leading to the development of new hardware, architectures, algorithms, and software required to address approaching physical and conceptual limits in computer processing power. Support will also begin for AST with emphasis on understanding the behavior of physical and biological systems across length and time scales, developing new instrumentation, and creating synthetic biological systems that can mimic nature. Increased funding is also requested for research at the MPS-Life Science Interface, Quantum Information Sciences, ACI Fellows Program, and CAREER. Strong support is requested for the Centers for Chemical Innovation and Materials Research Science and Engineering Centers. Within MPS facilities, modest increases for a number of observatories and labs will support the ongoing development of next generation instrumentation and enhance user programming; reduced funding will allow for planned programmatic transitions and phase outs.

Social, Behavioral and Economic Sciences **+18**

Funding increases for core disciplinary and interdisciplinary research, especially targeting research across traditional boundaries and potentially transformative research. A major contribution to the Administration's American Competitiveness Initiative comes through enhanced support for Science of Science and Innovation Policy (SciSIP) research and associated increases to enable a full-scale pilot of a redesigned Survey of Industrial Research and Development (renamed Business Research and Development Survey) as well as pilot data collection on postdoctoral research and education activities. Expansion of SBE research in complexity and systems thinking in the human sciences includes increases for SBE's participation in CDI. SBE participation in AST involves applying and expanding what is known from cognitive and learning sciences in partnership with other directorates. Within the Learning strategic area, funding increases for the Research Experiences for Undergraduates (Sites) program.

Office of Cyberinfrastructure	**+35**
OCI extends support for the development and provision of software and services that facilitate complex S&E research including innovative approaches to the management of data collections, software that enhances the interoperability of data and tools, and robust middleware that supports distributed applications. Additional areas of emphasis include the use of in situ computation in sensor networks, virtual organizations that are built around specific complex research foci, research aimed at improving the effectiveness of collaborative digital environments, and the development of more robust approaches to fault-tolerant computing in S&E. Increased funding will support high-performance computing systems for the national open S&E research community. These leading-edge computational resources, together with advanced networking capabilities, serve to maintain NSF's TeraGrid as the world's leading high-end computing environment for open research. Support for CDI includes development and deployment of cybertools.	
Office of International Science and Engineering	**+6**
Increased support for the Partnerships for International Research and Education program will fund innovative, international collaborative research projects that link U.S. institutions and researchers at all career levels with premier international collaborators to work at the most promising frontiers of new knowledge. Funding will also enable OISE to support the NSF-wide investment in CDI by working to link research communities across international boundaries to facilitate communication and collaboration. Additional funding will support the International Research Experiences for Students and the International Research Fellowship Program.	
Office of Polar Programs	**+48**
Funds will support IPY synthesis activities to provide an integrated understanding of environmental change in the Arctic, and to advance understanding of the Antarctic system in a global context. Support will increase for climate change research and the associated observing and modeling systems, and for development of instrumentation and equipment that have the potential to transform data collection, monitoring and modeling. Funds for IceCube Neutrino Observatory research and operations will increase. OPP will continue to enhance the critical infrastructure required to conduct research in the Arctic and in Antarctica, including use of alternative energy for power generation and use of energy efficient construction materials. Support will also increase to diversify and improve U.S. Antarctic Program resupply at McMurdo and Palmer Stations. Funding will increase for safety and health program activities. Funding decreases for USCG Icebreaking, as NSF will no longer provide funds for maintaining the *Polar Star* in caretaker status.	
Integrative Activities	**+44**
Funding increases for the Major Research Instrumentation (MRI) program, allowing for enhanced support for the acquisition and development of mid-size instruments. Funding also provides for additional support in the EPSCoR program and for a new class of five to seven Science and Technology Centers.	
United States Arctic Research Commission	**+0**
Increases funding by $60,000 to support Commissioners' salaries as well as travel and administrative costs.	
Subtotal, R&RA	**+773**

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Education and Human Resources	**+65**
Increased investment across EHR's five thematic priorities will provide continued national leadership in STEM research, policy and practice: Broadening Participation; Teacher Education in STEM; Furthering Public Understanding of Science; Promoting Cyber-enabled Learning Strategies; and Promoting Learning through Research and Evaluation. A significant increase will be directed to the Graduate Research Fellowship program, providing support for an additional 700 fellows. Increased funding for Discovery Research K-12 will support development of more effective tools and resources for teachers and students. Enhanced support for CREST, ADVANCE, and Research on GSE will contribute to the ongoing effort to broaden participation. Additional funds in the Scholarship for Service program will provide support for up to an additional nine cohorts of students. Enhanced funding for Project and Program Evaluation will support education research projects. Funding increases are focused on areas with demonstrated results, in keeping with the Academic Competitiveness Council framework.	
Major Research Equipment and Facilities Construction	**-73**
Funding will support ongoing construction of IceCube, ALMA, and Advanced LIGO, and will support design activities related to the ATST. No funding is requested for three ongoing projects, ARRV, NEON, and OOI, pending completion of final design reviews.	
Agency Operations and Award Management (formerly Salaries and Expenses)	**+23**
An allocation increase of 25 FTE will support achievement of NSF's Stewardship strategic goal. Continued emphasis will be placed on award oversight and management, particularly for large facilities. IT investments are realigned to tie mission-related activities more directly to NSF's programs.	
National Science Board	**+0**
A funding increase of $61,000 will be used for personnel compensation and general operating expenses.	
Office of Inspector General	**+2**
Increased funding of $1.67 million will cover higher personnel costs, the acquisition of software to make the auditing process more efficient, and the increasing costs of audits conducted by CPA firms under contract to OIG.	
Total Change, FY 2008 Estimate to FY 2009 Request	**+789**
NSF FY 2009 Budget Request to Congress	**$6,854**

Totals may not add due to rounding.