

MATHEMATICAL SCIENCES

\$245,700,000

The FY 2009 Request for the Mathematical Sciences Division (DMS) is \$245.70 million, an increase of \$33.91 million or 16 percent above the FY 2008 Estimate of \$211.79 million.

Mathematical Sciences Funding
(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over	
				FY 2008 Estimate Amount	Percent
Mathematical Sciences	\$205.74	\$211.79	\$245.70	\$33.91	16.0%
Major Components:					
Research and Education Grants	205.74	211.79	245.60	33.81	16.0%
Centers Programs	-	-	0.10	0.10	N/A

Totals may not add due to rounding.

About DMS:

The Division of Mathematical Sciences (DMS) advances the intellectual frontiers of the mathematical sciences and enables the advance of knowledge in other scientific and engineering fields. It plays a key role in training the Nation's science and engineering workforce. Driven in part by increasingly sophisticated and readily available computing environments, advances in science and engineering require ever more sophisticated mathematical and statistical tools.

NSF plays a crucial role in support of basic academic research in the mathematical sciences, as it provides almost 60 percent of all federal university-based support. In the core mathematical areas this percentage is even higher, with NSF supporting a broader range of infrastructure and fundamental and multidisciplinary research topics than other federal agencies. DMS plays a dominant role in developing the next generation of mathematical scientists.

DMS supports areas such as algebra, analysis, applied mathematics, combinatorics, computational mathematics, foundations, geometry, mathematical biology, number theory, probability, statistics, and topology. In addition, DMS supports national mathematical science research institutes; infrastructure, including workshops, conferences, and equipment; and postdoctoral, graduate, and undergraduate training opportunities. The DMS portfolio includes a variety of support modes and mechanisms. These include:

- research grants ranging in scope from individual-investigator awards to awards for multidisciplinary groups of researchers to attack problems of mathematical and scientific importance.
- major support for education and training, particularly through Enhancing the Mathematical Sciences Workforce for the 21st Century, which focuses on research training in the mathematical sciences and mentoring activities aimed at increasing the number of U.S. students choosing careers in the mathematical sciences.
- core support for five mathematical sciences research institutes as well as major support for three other institutes, all funded on a competitive basis to serve as incubators for new ideas and directions in the mathematical sciences and to address the growing interface with other disciplines.

In FY 2009, approximately 61 percent of funds requested for DMS will be available for new research awards, with the remainder going to continuing commitments from earlier years. In FY 2007, DMS received 2,222 research proposals and made 769 awards, for a success rate of 35 percent.

DMS Priorities for FY 2009:

Fundamental mathematical and statistical science, including activities that strengthen the core of the discipline and enable effective partnering with other science and engineering disciplines. This is a central enabler of the ACI.

Interdisciplinary research and education, including key components of ACI where the mathematical sciences play a critical role in discovery for competitiveness and innovation:

- **Cyber-enabled Discovery and Innovation** uses the mathematical sciences to provide new ways of obtaining insight into the nature of complex phenomena in science and engineering.
- **Science and Engineering Beyond Moore's Law** continues the algorithmic "Moore's Law", – the exponential increase in speed of basic computations due to innovative new algorithms, in parallel with Moore's Law for hardware – and develops new mathematical frameworks for computation.
- **Quantum Information Sciences** involves research on quantum computing and communications including the understanding and implementation of algorithms in QIS.
- **MPS-Life Sciences Interface** provides mathematical language, methods, and tools to describe complex, multiscale, and emergent phenomena in the life sciences. This activity promotes the emergence of biology as a quantitative science and encourages bio-technological innovation.
- **Adaptive Systems Technologies** involves a multidisciplinary approach to using the architecture and operation of biological systems to achieve function and complex behavior in man-made adaptive systems. Discovery in this area would lead to innovation in such areas as robotics, sensor systems, specialized materials, and assistive devices.
- **ACI Fellows** improves the freshman and sophomore experience in mathematics through involvement in interdisciplinary, discovery-based activities. It is designed to strengthen the Nation's scientific workforce by increasing numbers of successful undergraduate majors in mathematics, science, and engineering.

Mathematical Sciences Research Institutes and Networks, the Workforce program, and broadening participation at all levels in the mathematical sciences remain high priorities for DMS.

Changes from FY 2008:

- **Support for the core** increases by \$20.81 million, a significant portion of which will be used to further the aims of the ACI in part through interactions with other science and engineering disciplines and to restore cuts to division programs made in FY 2008. Award size and duration will be increased by providing adequate support for the most compelling projects and, to the extent possible, doing so without unduly reducing the success rate for unsolicited proposals.
- **Cyber-enabled Discovery and Innovation** increases by \$3.85 million.
- **Science and Engineering Beyond Moore's Law** will be supported at \$1.75 million.
- **Quantum Information Sciences** will be supported at the level of \$2.0 million.
- **MPS-Life Sciences Interface** will be supported at the level of \$1.0 million.
- **Adaptive Systems Technologies** will be supported at the level of \$500,000.
- **ACI Fellows** will be supported at the level of \$2.0 million.
- **Support for early career investigators** will increase by \$2.0 million to a total of \$8.16 million in order to increase the number of CAREER awards and to raise stipends for postdoctoral fellowships to a more competitive level.
- Support for the **Center for Research at the Interface of the Mathematical and Biological Sciences** will be \$100,000. This will be matched by the MPS Office of Multidisciplinary Activities. This center is predominantly supported by the Directorate for Biological Sciences.