

MATHEMATICAL SCIENCES

\$223,470,000

The FY 2008 Request for the Mathematical Sciences Division (DMS) is \$223.47 million, an increase of \$17.73 million or 8.6 percent above the FY 2007 Request of \$205.74 million.

Mathematical Sciences Funding

(Dollars in Millions)

	FY 2006 Actual	FY 2007 Request	FY 2008 Request	Change over	
				FY 2007 Request Amount	Percent
Mathematical Sciences	\$199.52	\$205.74	\$223.47	\$17.73	8.6%
Major Components:					
Research and Education Grants	199.52	205.74	223.47	17.73	8.6%

Totals may not add due to rounding.

About DMS:

The Mathematical Sciences Division 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 80 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 analysis, geometry, topology, foundations, algebra, number theory, combinatorics, applied mathematics, statistics, probability, mathematical biology, and computational mathematics. Awards in these areas fund a variety of research projects, as well as workshops, computing equipment, and other research and education needs. In addition, DMS supports infrastructure, including national research institutes and postdoctoral, graduate, and undergraduate training opportunities. The DMS portfolio includes a variety of support modes and mechanisms. These include:

- DMS research grants range in scope from individual-investigator awards to awards for multidisciplinary groups of researchers to attack problems of mathematical and scientific importance.
- DMS provides major support for education and training, particularly through Enhancing the Mathematical Sciences Workforce for the 21st Century (EMSW21), which focuses on research training activities in the mathematical sciences and mentoring activities aimed at increasing the number of U.S. students choosing careers in the mathematical sciences.
- DMS provides 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 an incubator for new ideas and directions in the mathematical sciences and to address the growing interface with other disciplines.

In FY 2008, approximately 60 percent of the funds requested for DMS will be available for new research awards, with the remainder going to continuing commitments from earlier years. In FY 2006, DMS

received 2,272 research proposals and made 685 awards, for a success rate of 30 percent.

DMS Priorities for FY 2008:

Fundamental mathematical and statistical science includes activities that strengthen the core of the disciplines and enable effective partnering with other science and engineering disciplines. Single investigator and small group research grants form the core of the DMS portfolio and play a central role in advancing the frontiers of knowledge. This is a central enabler of the ACI.

Cyber-enabled Discovery and Innovation (CDI) in the mathematical sciences incorporates modeling, algorithms, and simulation to provide new ways of obtaining insight into the nature of complex phenomena in science and engineering. Emphasis areas essential to advancing the ACI include algorithm development and computational tools for large-scale problems of scientific importance, modeling of phenomena that occur over a large range of spatial and temporal scales, and finding patterns in the structure of large data sets.

Science Beyond Moore's Law (SBML) challenges the mathematical sciences to continue the algorithmic "Moore's Law" – i.e., the exponential increase in speed of basic computations due to innovative new algorithms, in parallel with Moore's Law for hardware – and to develop new mathematical frameworks for computation. Emphasis areas include algorithm design, analysis, and implementation; scalability in space and time; quantification of errors and uncertainty; and visualization of large data sets. This is a key component of the ACI.

Broadening participation in the mathematical sciences will emphasize the support of interactions and research networks among a diverse population that will include students and researchers at a wide array of institutions. DMS will continue to emphasize the role of institutes in broadening participation.

Education and training activities include research experiences and mentoring activities aimed at increasing the number of U.S. students choosing careers in the mathematical sciences. Support for EMSW21 remain level.

Changes from FY 2007:

- **Support for the core** increases by \$7.30 million in order to sustain the success rate for individual investigator proposals. Award size and duration will be maintained to the extent possible by providing adequate support levels for the most compelling projects and without reducing the success rate for unsolicited proposals. In addition, DMS will move to restore the recent gains made in supporting more graduate students and postdoctoral researchers within single investigator grants. Some of the investments in formal interdisciplinary partnerships through the now concluded Mathematical Sciences Priority Area will be continued. The remainder of these investments will be redirected to unsolicited proposals, while retaining their spirit and integrating them fully into the core.
- **Cyber-enabled Discovery and Innovation (CDI)** will be supported at the level of \$5.20 million.
- **Science Beyond Moore's Law (SBML)** will be supported at the level of \$1.50 million.
- **Discovery-based undergraduate experiences** will increase by \$1.0 million and will build on current investments both within the mathematical sciences and on the interface with other disciplines. This activity is designed, in part, to better prepare students to pursue careers in fields that require integrated strengths between the mathematical sciences and other disciplines.
- **Mathematical sciences institutes and networks** will increase by \$2.73 million to support the DMS portfolio of collaborations; research and training projects; scientific and public outreach activities; and programs to broaden participation in the mathematical sciences.