

# Mathematical Sciences (DMS)

## **Algebra, Number Theory and Combinatorics** (ANTC)

**Deadline: First Tuesday in October,  
Annually**

Supports research in algebra, including algebraic structures, general algebra, and linear algebra; number theory, including algebraic, analytic number theory, arithmetic geometry, quadratic forms, and automorphic forms; combinatorics, including graph theory; and algebraic geometry.

## **Analysis**

**Deadline: First Tuesday in October,  
Annually**

The Analysis Program supports basic research in that area of mathematics whose roots can be traced to the calculus of Newton and Leibniz. Given its centuries-old ties to physics, analysis has influenced developments from Newton's mechanics to quantum mechanics and from Fourier's study of heat conduction to Maxwell's equations of electromagnetism to Witten's theory of supersymmetry. More generally, research supported by Analysis provides the theoretical underpinning for the majority of applications of the mathematical sciences to other scientific disciplines. Current areas of significant activity include: nonlinear partial differential equations; dynamical systems and ergodic theory; real, complex and harmonic analysis; operator theory and algebras of operators on Hilbert space; mathematical physics; and representation theory of Lie groups/algebras. Emerging areas include random matrix theory and its ties to classical analysis, number theory, quantum mechanics, and coding theory; and development of noncommutative geometry with its applications to modeling physical phenomena. It should be stressed, however, that the underlying role of the Analysis Program is to provide support for research in mathematics at the most fundamental level. Although this is often done with the expectation that the research will generate a payoff in applications at some point down the road, the principal mission of the Program is to tend and replenish an important reservoir of mathematical knowledge, maintaining it as a dependable resource to be drawn upon by engineers, life and physical scientists, and other mathematical scientists, as need arises.

## **Applied Mathematics**

**Deadline: November 1 - 15, Annually**

Supports mathematics research motivated by or having an effect on problems arising in science and engineering. Mathematical merit and novelty, as well as breadth and quality of impact on applications, are important factors. Proposals to develop critical mathematical techniques from individual investigators as well as interdisciplinary teams are encouraged.

## **Computational Mathematics**

**Deadline: December 1-15, Annually**

Supports mathematical research in areas of science where computing plays a central and essential role, emphasizing algorithms, numerical methods, and symbolic methods. The prominence of computation in the research is a hallmark of the program. Proposals ranging from single-investigator projects that develop and analyze innovative computational methods to interdisciplinary team projects that not only create new mathematical and computational techniques but use them to model, study, and solve important application problems are encouraged.

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## **Foundations**

**Deadline: First Tuesday in October,  
Annually**

The program in Foundations supports research in mathematical logic and the foundations of mathematics, including proof theory, recursion theory, model theory, set theory, and infinitary combinatorics.

## **Geometric Analysis**

**Deadline: First Tuesday in November,  
Annually**

The program in Geometric Analysis supports research on differential geometry and its relation to partial differential equations and variational principles; aspects of global analysis, including the differential geometry of complex manifolds and geometric Lie group theory; geometric methods in modern mathematical physics; and geometry of convex sets, integral geometry, and related geometric topics.

## **Mathematical Biology**

**Deadline: Check NSF web site.  
<http://www.nsf.gov/div/index.jsp?div=DMS>**

The Mathematical Biology Program supports research in areas of applied and computational mathematics with relevance to the biological sciences. Successful proposals are mathematically innovative and address challenging problems of interest to members of the biological community.

Projects may include development of mathematical concepts and tools traditionally seen in other disciplinary programs within the Division of Mathematical Sciences, e.g., topology, probability, statistics, and computation, etc. To receive appropriate and timely review, such proposals should be submitted directly to the relevant disciplinary program, but will be considered for co-review by the Mathematical Biology program which may be selected as a secondary program. Note that proposals that use established mathematical, statistical and computational tools to address problems in the biological sciences are typically not appropriate for consideration by the disciplinary programs within DMS. For further details on other disciplinary programs within the division, see the details of the program descriptions.

In general, if a proposal is appropriate for review by more than one disciplinary program within the Division of Mathematical Sciences, it is advisable to contact the program officers handling each program to determine when the proposal should be submitted and to facilitate the review process. Usually, it is most appropriate to submit in line with the earliest program deadline. If proposals are appropriate for co-review, but are not received in time to include them in the review process for all programs, then they may be considered by only a subset of the programs or may be returned without review. In addition, the Mathematical Biology Program interacts with every division in the NSF Directorate of Biological Sciences, and its interests overlap those of the biology programs. Mathematical Biology regularly seeks joint reviews of proposals with programs in the Directorate of Biological Sciences. Investigators are encouraged to discuss their project with program officers in both areas to determine if it should be considered for co-review.

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## **Probability**

**Deadline: October 23 -  
November 7, Annually**

The Probability Program supports research on the theory and applications of probability. Subfields include discrete probability, stochastic processes, limit theory, interacting particle systems, stochastic differential and partial differential equations, and Markov processes. Research in probability which involves applications to other areas of science and engineering is especially encouraged.

## **Statistics**

**Deadline: October 23, -  
November 7, Annually**

The Statistics Program supports research in statistical theory and methods, including research in statistical methods for applications to any domain of science and engineering. The theory forms the base for statistical science. The methods are used for stochastic modeling, and the collection, analysis and interpretation of data. The methods characterize uncertainty in the data and facilitate advancement in science and engineering. The Program encourages proposals ranging from single-investigator projects to interdisciplinary team projects.

## **Topology**

**Deadline: First Tuesday in November,  
Annually**

Supports research on algebraic topology, including homotopy theory, ordinary and extraordinary homology and cohomology, cobordism theory, and K-theory; topological manifolds and cell complexes, fiberings, knots, and links; differential topology and actions of groups of transformations; geometric group theory; and general topology and continua theory.