
Mathematics Opportunities

Summer 2000 Research for U.S. Graduate Students in Science and Engineering

The National Science Foundation (NSF), the National Institutes of Health/Fogarty International Center (NIH/FIC), and the U.S. Department of Agriculture/Agricultural Research Service (USDA/ARS) are cosponsoring a summer research program in 2000 for U.S. graduate students in Japan, Korea, and Taiwan.

The Summer Institute in Japan, the Monbusho Summer Program, the Summer Institute in Korea, and the Summer Institute in Taiwan provide graduate students in science and engineering with first-hand experience in Japanese, Korean, and Taiwan research environments, an introduction to the science and science policy infrastructure of the respective countries, and language and cultural training. The primary goals of the programs are to introduce students to Japanese, Korean, and Taiwan science and engineering in the context of a research laboratory and to initiate personal relationships that will better enable the students to collaborate with their counterparts in other countries in the future. The programs will last approximately eight weeks, from mid-June to August. Students may study and work at one of a variety of government, corporate, and university research laboratories, depending on the specific program.

Applicants must be U.S. citizens or permanent residents. They must be enrolled at a U.S. institution in a science or engineering Ph.D. program, in an M.D. program with an interest in biomedical research, or in a master's degree program with at least one full academic year completed at the end of the calendar year of application. They must be

pursuing studies in fields of science or engineering that are supported by the NSF, the NIH, or the USDA and that also are represented among the potential host institutions.

International travel costs to and from Japan, Korea, or Taiwan, in-country living costs (accommodations, food, and professional travel), and an allowance of \$2,500 for each participant will be provided.

The deadline for application materials to be postmarked is **December 1, 1999**. All application materials (including forms from the applicant and from those recommending him or her) should be sent to the NSF East Asia and Pacific Program (NSF/EAP), Room 935, Division of International Programs, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230.

Further information and a full description of the summer programs, including a list of potential host institutions and application instructions, are available at the NSF/Tokyo Web site, <http://www.twics.com/~nsftokyo/> (select "Summer Programs" from the opening screen menu bar), or from Christopher A. Loretz, NSF/EAP; telephone: 703-306-1701; e-mail: cloretz@nsf.gov.

—From an NSF announcement

NRC-Ford Foundation Postdoctoral Fellowships for Minorities

The National Research Council (NRC) administers the Ford Foundation Postdoctoral Fellowships for Minorities. This program enables teacher-scholars to engage in postdoctoral research and scholarship in an environment free from the

interference of their normal professional duties and helps them to achieve greater recognition in their respective fields and to develop the professional associations that will make them more effective and productive in academic employment.

Approximately 25 one-year postdoctoral fellowships will be awarded for 2000. The total award package for each fellowship is \$40,000, which includes a \$30,000 stipend and a travel and relocation allowance.

Eligible applicants must be U.S. citizens or nationals who are members of one of the following ethnic minority groups: Alaskan Natives (Eskimo or Aleut), Black/African Americans, Mexican Americans/Chicanos/Chicanas, Native American Indians, Native Pacific Islanders (Polynesian or Micronesian), or Puerto Ricans. Applicants are required to have earned the Ph.D. or Sc.D. degree from a U.S. educational institution by March 1, 2000, and may not have held the degree for more than seven years as of the deadline date.

The deadline date for applications is **January 7, 2000**. Awards will be announced in early April.

Further information is available at <http://www4.nationalacademies.org/>, or contact the Fellowship Office, National Research Council, 2101 Constitution Avenue, NW, Washington, DC 20418; telephone 202-334-2860.

—From an NRC announcement

National Research Council Research Associateship Programs

The National Research Council (NRC) is sponsoring the 2000 Postdoctoral and Senior Research Associateship Programs. The programs are meant to provide opportunities for Ph.D., Sc.D., or M.D. scientists and engineers of unusual promise and ability to perform research at one of more than 120 research laboratories throughout the United States.

Approximately 350 new full-time associateships will be awarded for research in the fields of mathematics, chemistry, earth and atmospheric sciences, engineering, applied sciences and computer science, life and medical sciences, space and planetary sciences, and physics. Most of the laboratories are open to both U.S. and non-U.S. nationals and to both recent doctoral recipients and senior investigators.

Awards are made for one or two years, renewable for a maximum of three years. Annual stipends for recent Ph.D. recipients range from \$30,000 to \$50,000, depending on the sponsoring laboratory; the awards for senior recipients will be higher. Support is also provided for allowable relocation expenses and for limited professional travel during the period of the award.

Awards will be made three times during the year, and applications will be accepted on a continuous basis. The deadlines for application materials to be postmarked are **January 15, April 15, and August 15, 2000**. The award

recipients will be announced in March-April, July, and November.

For further information and application materials, see the NRC Web site at <http://www.national-academies.org/rap/>, or contact the National Research Council, Associateship Programs (TJ 2114/D3), 2101 Constitution Avenue, NW, Washington, DC 20418; telephone 202-334-2760; fax 202-334-2759; e-mail: rap@nas.edu.

—From an NRC announcement

EDGE Summer Program

Funded by the National Science Foundation, the National Security Agency, and the Andrew W. Mellon Foundation, the Enhancing Diversity in Graduate Education (EDGE) Program, a postbaccalaureate summer enrichment program, is designed to strengthen the ability of women and minority students to successfully complete graduate programs in the mathematical sciences.

The summer program consists of two core courses in analysis and algebra/linear algebra. There will also be mini-courses in vital areas of mathematical research in pure and applied mathematics, short-term visitors from academia and industry, guest lectures, graduate student mentors, and problem sessions. In addition, a follow-up mentoring program and support network will be established with the participants' respective graduate programs.

Applicants to the program should be women who are (i) graduating seniors who have applied to graduate programs in the mathematical sciences, (ii) recent recipients of undergraduate degrees who are now entering graduate programs, or (iii) first-year graduate students. All applicants should have completed standard junior-senior level undergraduate courses in analysis and abstract algebra and have a desire to earn the doctorate degree. Women from minority groups who fit one of the above three categories are especially encouraged to apply. Final acceptance to the program is contingent upon acceptance to a graduate program in the mathematical sciences.

In 2000 the program will be held at Bryn Mawr College in Bryn Mawr, PA, and in 2001 at Spelman College in Atlanta, GA. The dates for the 2000 program are June 5–30. It will be codirected by Sylvia Bozeman (Spelman College) and Rhonda Hughes (Bryn Mawr College). A stipend of \$1,800 plus room and board will be awarded to participants. Participants in the program will be announced by April 15, 2000.

Applications should consist of the following:

- a completed application form;
- a statement describing the expected value of this program to the applicant's academic goals;
- two letters of recommendation from mathematical sciences faculty familiar with the applicant's work;
- a transcript and current résumé;
- a list of graduate programs to which the applicant has applied, together with a ranked list of her two or three top choices.

The application deadline is **March 1, 2000**. Applications should be sent to: EDGE Program, Department of Mathematics, Bryn Mawr College, Bryn Mawr, PA 19010.

Visit the program's Web site at <http://www.brynmawr.edu/Acads/Math/>.

—EDGE Program announcement

News from the Institute for Pure and Applied Mathematics

The Institute for Pure and Applied Mathematics (IPAM) at the University of California, Los Angeles, is organizing the following programs for 2000-01.

Fall 2000: Functional Genomics. Organizing Committee: K. Lange, S. Tavare, M. Waterman, W. Wong. The first event will be tutorials, to be held September 19–27. Dates will be announced for workshops in DNA Arrays and Disease and Expression Arrays and Genetic Networks. The program will culminate in a workshop to be held December 11–15 at Lake Arrowhead.

With the recent development of gene expression arrays, it has become possible to measure simultaneously the level of expression of thousands of genes by measuring the amount of each type of mRNA present in a collection of cells. Biologists will study differences in gene expression among cell types to elucidate the steps of normal development and tissue differentiation. By examining the level of gene expression in cell populations of disease and pre-disease states, investigators will attempt to understand the steps of disease development and to identify the genes involved in disease susceptibility and gene-environment interactions. Within the next two years it is anticipated that microarrays will be produced that contain DNA from almost all human genes. The greatest hurdles to the effective development and use of DNA microarrays are problems of mathematics and statistics. There are key problems of image analysis of the fluorescent signals for which improved solutions are needed and difficult problems of combinatorial mathematics for the design of oligonucleotides in the related development of oligo-arrays that are useful for new sequencing and genotyping methods. The problems of how to elucidate genetic networks based on time-sequenced gene expression data are challenging. There are important problems of how to classify cells based on expression pattern and how to develop diagnostic disease classification systems. Because of the high dimensionality of the data obtained from microarray experiments, there are many challenging problems of multiplicity and multivariate analysis that must be addressed. DNA microarrays will finally provide the data from which we may attempt to understand simple organisms as entire systems; this will require new levels of collaboration among mathematical scientists and biologists.

Spring 2001: Geometrically Based Motions. Organizing Committee: J.-M. Morel, S. Osher, P. Souganidis. Tutorials will be held from March 27–April 6. Dates will be announced for workshops on Material Interfaces and Geo-

metrically Based Motions and Imaging in Medicine and Neurosciences. The culminating workshop will be held June 11–15 at Lake Arrowhead.

A recent exciting development that bridges pure and applied mathematics and that has had a powerful and wide-reaching effect involves new numerical and analytic techniques for computing geometric objects and capturing moving interfaces, as well as the real-world applications (ranging from materials science to image processing) that can now be investigated using these new methods. The level-set method and the theory of viscosity solutions have matured into enabling technologies. Related numerical and analytical ideas—including high-resolution numerical methods, convolution-generated motion, threshold dynamics, dynamic surface extension, cellular automata, stochastic partial differential equations, and harmonic maps—some of which are quite novel, some of which are classical, are relevant to geometrically based motions. The applications of these and related ideas include: interfaces in materials science; computer-aided design; robotics; high-frequency wave propagation; and inverse problems, for example, in geophysics, image processing, computer vision, computer graphics, neuroscience, multiphase (reacting and nonreacting) flows in fluid dynamics, and the connection to structures. Further applications continue to arise. The program will include workshops selected from the following topics: materials science, geometric flows, image processing, computer vision, computer graphics (including applications to the entertainment industry), phase transitions, multiphase flows, interfaces in geophysics, neuroscience, applications and theory of harmonic maps. The goal of the program is to foster working relationships among researchers studying mathematical and numerical techniques and people doing real-world applications.

IPAM welcomes applications from mathematicians and scientists at all levels to participate in its programs. IPAM programs usually last twelve weeks; one-week reunion conferences are held in each of the following two years. A broad spectrum of researchers is welcomed, ranging from committed experts to those with an interest in exploring interdisciplinary work, and from academics to those in industry and at national labs. Graduate students, recent doctoral recipients, junior and senior faculty, and researchers in industry are encouraged to apply.

Further information, application forms, and instructions are available on the IPAM Web site, <http://www.ipam.org/>, or by contacting Mark Green or Eitan Tadmor at the Institute for Pure and Applied Mathematics, Department of Mathematics, University of California, Los Angeles, CA 90095-1555; telephone 310-825-4701; fax 310-206-6673; e-mail: ipam@math.ucla.edu.

—IPAM announcement