Mathematics Opportunities

News from the Institute for Mathematics and its Applications

University of Minnesota

The 1998–99 program at the IMA will be **Mathematics in Biology**. The fall 1998 term will be devoted to the topic, **Theoretical Problems in Developmental Biology and Immunology**.

The program will kick off with a tutorial on **Mathematical and Computational Issues in Pattern Formation** (September 3–4, 1998), an introduction to the two back-to-back workshops on developmental biology. It will be followed by the workshop **Pattern Formation and Morphogenesis: The Basic Process** (September 8–12, 1998).

Pattern formation and morphogenesis in developmental biology involves the spatio-temporal coordination of growth, cell-cell signaling, tissue movement, gene expression, and cell determination. The meeting will bring together leading theoreticians from the mathematical and biological communities. The mathematical problems to be discussed include: how patterns are generated reliably in the face of biological variation, the long-term behavior of chemotaxis equations, and how one incorporates information about the microscopic behavior of individual cells into a macroscopic continuum description. Computational aspects that arise include effective methods for computing solutions of systems of reaction diffusion (RD) equations or coupled RD/fluid problems in three space dimensions, and the numerical bifurcation analysis of systems of partial differential equations.

The companion workshop **Pattern Formation and Morphogenesis: Model Systems** will be held September 14–18, 1998. This workshop emphasizes the modeling of complicated biological systems, the qualitative and numerical analysis of the resulting model equations, and the interpretation and modification of models in the light of experimental data. The mathematical topics that arise in these models include dynamical systems theory, partial differential equations, and large-scale numerical simulations. The breadth of model systems involved should lead to extensive cross-fertilization between these areas, encourage new collaborations, and provide new problems in modeling and mathematical analysis.

The immunology portion of the fall program will get under way with a tutorial on **Immunology, Cell Signaling, the Physiology of the Immune System, and the Dynamics of the Immune Response** (October 8–9, 1998). Lectures will be given on cell signaling, the physiology of the immune system, and the dynamics of the immune response in order to provide mathematicians with sufficient background to participate effectively in the workshop **Immune System Modeling and Cell Signaling** (October 12–16, 1998). The general goal of this workshop will be to bring together immune system theorists and experimental immunologists with mathematicians who can become stimulated in this exciting and important area and who may be able to make an impact by contributing new methods and tools of analysis. Participants will consider how cells of the immune system receive and send signals and will then focus on questions concerning the dynamics of interactions among B cells, T cells, and antigen presenting cells, and the regulation of these populations. Events occurring during immune responses will also be examined, including the formation of spatial structures, such as germinal centers, as

well as problems dealing with somatic mutation and affinity maturation. The mathematics employed involves systems of nonlinear ordinary differential equations, partial differential equations, cellular automata, stochastic processes, and computer simulation.

During October 19–23, 1998, the IMA will offer a Period of Concentration: **Forging an Appropriate Immune Response as a Problem in Distributed Artificial Intelligence**. How are the vast collections of cells and molecules that comprise the immune system organized to provide appropriate responses (selected from an extensive set of possible responses) to the wide variety of evolving pathogens that attack the organism during its lifetime? It is the premise of this workshop that the "response choice" problem and its solution in natural immune systems can usefully be viewed as an example of bottom-up and distributed artificial intelligence. Relevant concepts of artificial intelligence and computer science will be presented, with examples of their application. One important example concerns computer security against "viruses" and other intrusions, for here the interaction of immunology and computer science has already begun to prove fruitful. This workshop should be mutually beneficial for computer scientists as well as experimental and theoretical immunologists.

The last workshop of the fall term will be **Dynamics and Control of AIDS** (November 9–13, 1998). HIV infection and AIDS are among the major unresolved health problems in this century. Mathematics can serve as an important tool in improving our understanding of the dynamics of this disease. This workshop will focus on modeling HIV dynamics and the interaction of HIV with the immune system. Also, some issues of disease spread at the population level will be examined. Large numbers of cells and organisms and long time scales make differential equations the appropriate and primary tool used to study these phenomena. Delay equations, simulations, and stochastic models also play a role.

The winter term will be devoted to **Mathematical Problems in Physiology**. More detailed descriptions of the winter 1999 program are expected to appear in a future issue of *Notices*.

For more information about this program or about IMA activities in general and how to register, contact the IMA by e-mail: `staff@ima.umn.edu` or through the World Wide Web (`http://www.ima.umn.edu/`).

—IMA announcement

CAREER/PECASE Program Guidelines on Web

Program Guidelines for the National Science Foundation (NSF) CAREER/PECASE programs are now available on the World Wide Web. The new CAREER program announcement can be found at `http://www.nsf.gov/cgi-bin/getpub?nsf98103/`. The announcement number, NSF98-103, replaces NSF 97-87 and appears only on the Web.

The CAREER program is intended for the support of excellent proposals from junior faculty who combine strong research activity with a genuine and substantive involvement in education. Proposals will be evaluated on the basis of both research and education. Proposal requests should be submitted for NSF support totaling at least $200,000 and for an award duration of at least four, but not more than five, years. The deadline is **July 22, 1998**.

Beginning in 1997, NSF will select from the most meritorious awardees supported by the CAREER program nominees for the Presidential Early Career Awards for Scientists and Engineers (PECASE). PECASE awards recognize outstanding scientists and engineers who, early in their careers, show exceptional potential for leadership at the frontiers of knowledge. This presidential award is the highest honor bestowed by the United States government on scientists and engineers beginning their independent careers.

It is expected that the Division of Mathematical Sciences (DMS) will make a small number of CAREER awards. In each of the previous two years, FY 97 and FY 98, four awards were made. The division continues to encourage proposals to its "traditional" research grant programs that integrate research and education activity or that have significant education components. Applicants are encouraged to confer with program directors.

A home page for CAREER and PECASE has been created at `http://www.nsf.gov/home/crssprgm/career/`. Before preparing a CAREER proposal, applicants are strongly encouraged to refer to the CAREER "Frequently Asked Questions (FAQ)" document (CAREER-FAQ), available on the CAREER Web page. The mailing address for the NSF is National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230. The telephone number for the DMS is 703-306-1870.

—National Science Foundation announcement

Ferran Sunyer i Balaguer Prize

Each year the Institut d'Estudis Catalans awards the Ferran Sunyer i Balaguer Prize. This prize honors the memory of Ferran Sunyer i Balaguer (1912–1967), a self-taught Catalan mathematician who, in spite of a serious physical disability, was very active in research in classical analysis and acquired international recognition.

The Ferran Sunyer i Balaguer Prize is awarded to a mathematical monograph of an expository nature presenting the latest developments in an active area of research in mathematics in which the author(s) has (have) made important contributions. The prize of 1,800,000 pesetas (approximately $12,400) is provided by the Ferran Sunyer i Balaguer Foundation. Authors are invited to submit their manuscripts for consideration for the prize.

The manuscript must be original, written in English, and of at least 150 pages. In exceptional cases, manuscripts in other languages may be considered. The winning monograph will be published in Birkhäuser's Progress in

Mathematics series, subject to the usual regulations concerning copyright and author's rights.

The winner of the prize will be proposed by the Scientific Committee, consisting of: Friedrich Hirzebruch, Max-Planck-Institut für Mathematik, Bonn; Paul Malliavin, Université de Paris VI; Joseph Oesterlé, Université de Paris VI; Joan Solà Morales, Universitat Politècnica de Catalunya; and Alan Weinstein, University of California, Berkeley.

Manuscripts should be typeset in TEX. Authors should send a hard copy and two disks with .dvi and PostScript files together with a submission letter to: Institut d'Estudis Catalans, Apartat 50, 08193 Bellaterra, Spain; e-mail: `crm@crm.es`. This material should be sent before **December 5, 1998**. The name of the prize winner will be announced in Barcelona in April 1999. For further information on the Ferran Sunyer i Balaguer Foundation, consult the Web site `http://crm.es/info/ffsb.htm`.

Note: An announcement of this year's winner of the Ferran Sunyer i Balaguer Prize appears in the "Mathematics People" section in this issue of the *Notices*.

—from Institut d'Estudis Catalans announcement

Editor's Note: Birkhäuser Basel confirms that it will publish the prize-winning book.

Deadlines and Target Dates at the NSF

The Division of Mathematical Sciences (DMS) of the National Science Foundation has a number of programs in support of mathematical sciences research and education. Listed below are the names of programs having deadlines or target dates coming up in the next several months.

July 22, 1998 (deadline): Faculty Early Career Development (CAREER) Program

September 1, 1998 (deadline): Grants for Vertical Integration of Research and Education (VIGRE)

September 15, 1998 (deadline): Research Experiences for Undergraduates Sites (send inquiries to: `reu.dms@nsf.gov`)

October 10, 1998 (target date): Algebra & Number Theory

October 10, 1998 (target date): Analysis

October 17, 1998 (deadline): Mathematical Sciences Postdoctoral Research Fellowships (send inquires to: `msprf@nsf.gov`)

November 7, 1998 (target date): Applied Mathematics (excluding Mathematical Biology)

November 7, 1998 (target date): Statistics & Probability

November 7, 1998 (target date): Geometric Analysis

November 7, 1998 (target date): Topology & Foundations

November 13, 1998 (deadline): University-Industry Cooperative Research Programs in the Mathematical Sciences

November 23, 1998 (full proposal deadline): 1998 Competition for Integrative Graduate Education and Research Training (IGERT)

December 4, 1998 (target date): Computational Mathematics

December 4, 1998 (target date): Mathematical Biology

December 9, 1998 (deadline): Professional Opportunities for Women in Research and Education (POWRE)

February 1, 1999 (full proposal deadline): Knowledge and Distributed Intelligence

February 20, 1999 (deadline): Scientific Computing Research Equipment for the Mathematical Sciences

April 15, 1999 (preproposal deadline) and September 7, 1999 (full proposal deadline): 1999 Competition for Integrative Graduate Education and Research Training (IGERT)

Proposals for Conferences, Workshops, and Special Years that are submitted to the Statistics program or to the Topology & Foundations program can be sent at any time. However, proposals for these activities that are submitted to all other DMS programs (Analysis, Algebra & Number Theory, Applied Mathematics, Computational Mathematics, and Geometric Analysis) must be submitted according to the target dates for those programs. Proposals for supplements for Research Experiences for Undergraduates may be submitted at any time.

For further information consult the DMS Web site at `http://www.nsf.gov/mps/dms/`. The mailing address is Division of Mathematical Sciences, National Science Foundation, Room 1025, 4201 Wilson Boulevard, Arlington, VA 22230. The telephone number is 703-306-1870.

—DMS

AWM Workshops for Women Graduate Students and Postdocs

Over the past nine years the Association for Women in Mathematics (AWM) has held a series of workshops for women graduate students and recent Ph.D.s in conjunction with major mathematics meetings.

The next AWM workshop to be held in conjunction with the annual Joint Mathematics Meetings will be in San Antonio, Texas, January 13–16, 1999. The workshop will be held on Saturday, January 16, 1999, with an introductory dinner on Thursday evening, January 14, 1999.

Twenty women will be selected in advance of the workshop to present their work; the selected graduate students will present posters, and the postdocs will give 20-minute talks. AWM will offer funding for travel and two days' subsistence for the selected participants. The workshop will also include a panel discussion on issues of career development, a luncheon, and a dinner with a discussion period. Participants will have the opportunity to meet with other women mathematicians at all stages of their careers. All mathematicians (female and male) are invited to attend the program. Departments are urged to help graduate students and postdocs who do not receive funding to obtain some institutional support to attend the workshop and the associated meetings.

The AWM also seeks volunteers to lead discussion groups and to act as mentors for workshop participants.

People interested in volunteering, should contact the AWM office.

Applications are welcome from graduate students who have made substantial progress toward their theses and from women who have received their Ph.D.s within approximately the last five years. (The word "postdocs" refers to recent Ph.D.s, whether or not they currently hold a postdoctoral or other academic position.) Women with grants or other sources of support are still welcome to apply. All non-U.S. citizens must have a current U.S. address. All applications should include a curriculum vitae, a concise description of research (2–3 pages), and a title of the proposed talk/poster. All applications should also include at least one letter of recommendation; in particular, graduate students should include a letter of recommendation from their thesis advisors. Nominations by other mathematicians (along with the information described above) are also welcome.

Send *five* complete copies of the application materials (including the cover letter) to: Workshop Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, Maryland 20742-2461. For further information contact the AWM by telephone at 301-405-7892 or by e-mail at `awm@math.umd.edu`. Applications via e-mail or fax are not acceptable.

Applications must be received by **September 1, 1998**.

—AWM announcement