For Your Information

Mathematics Subject Classification 2010

Mathematical Reviews (MR) and *Zentralblatt für Mathematik* (Zbl) collaborate in maintaining the Mathematics Subject Classification (MSC), which is used by these reviewing services and many others to categorize items in the mathematical sciences literature. The current version, MSC2000, consists of 63 areas classified with two digits refined into over 5,000 three- and five-digit classifications. The MSC has undergone a general revision, with some additions, changes, and corrections, to create MSC2010, the successor to the present MSC2000. As anticipated, there are no changes at the two-digit level, but refinements have been made at the three- and five-digit levels. MR and Zbl are now using MSC2010 as their classification scheme.

MR and Zbl carefully considered input received from the community in recent years, especially since the announcement of the projected revision in December 2006, and used it in the preparation of their joint MSC revision. The final MSC2010, the result of four working drafts, can be viewed at `http://msc2010.org`. These drafts were publicly developed using the MSCwiki at this site, which will remain open for public view and to document any corrections to MSC2010 that may be made. Various PDF forms and an interactive TiddlyWiki version of MSC2010 are also there.

MR and Zbl welcome and encourage community adoption of MSC2010. Comments can be submitted through the Web form found at `http://msc2010.org/feedback` or by email to `feedback@msc2010.org`. All information about MSC2010 is jointly shared by MR and Zbl.

The editors and their staffs wish to express their gratitude to the numerous members of the community for their assistance in this lengthy revision process.

—Graeme Fairweather, executive editor, MR, and Bernd Wegner, editor-in-chief, Zbl

NSF Math Institutes Create New Jobs

The seven National Science Foundation (NSF) Mathematical Sciences Research Institutes announced in May 2009 the creation of 45 new one- and two-year positions for young, highly trained mathematical scientists across the country. In addition to furthering research in all areas of the mathematical sciences, these positions will allow recent Ph.D.'s to teach at community colleges and other higher-education institutions or to participate in projects tied to business and industry. This new initiative is a result of a partnership among the NSF-supported mathematics institutes.

The impact of the economic downturn is being felt everywhere, including academia. This year has seen widespread hiring freezes and canceled job searches at universities across the country. For the mathematical science community, this has meant almost 400 positions lost for recent Ph.D.'s. The severity of the situation became apparent earlier this year when many graduates, even of top-tier programs, were facing unemployment. The NSF, through its mathematics institutes, responded by creating these new postdoctoral fellowships.

The training of these young scientists represents a long-term investment. The postdocs typically spent five years in graduate education, often with some level of support from state or federal funds.

"These new researchers are primed to make significant contributions to their fields," said Peter March, director of NSF's Division of Mathematical Sciences. The newly created positions will place highly trained people as teachers at two- and four-year colleges and universities, as well as in business and industry.

"These positions not only refine the research skills of new Ph.D.'s but provide them with opportunities to apply their training in other settings," said Russ Caflisch, director of the Institute for Pure and Applied Mathematics (IPAM). "The role of research along with teaching or industry mentors and professional development workshops reinforces the institutes' commitment to ensuring the continued success of these young people in the workforce."

Exactly one month elapsed between the first meeting of the seven mathematics institute directors and the close of applications. More than 750 applications were received for the 45 positions. Typically, academic job searches begin in the fall and take several months to complete.

"The timing was perfect," said Eddie Herman, one of the newly hired mathematicians. "Most academic positions are decided by the middle of March, so the institutes began advertising at exactly the time when many of us were losing hope of finding a research position and were ready to look for other jobs." Herman received his Ph.D. from UCLA this year.

The economic downturn is being felt by everyone, including the research and academic community. Universities are canceling job searches, which limits the number of positions for new Ph.D.'s and people completing postdoctoral training. Additionally, many U.S. graduate programs have reduced the size of their incoming classes. In fact, some programs will not be admitting any students in the next academic year. This will have the effect of diminishing the size of our next generation of scientists, those who would be graduating at a time when our economy is recovering and in need of a highly trained workforce.

Currently, many workers are seeking retraining in response to the needs of the changing economy just as colleges and universities face cutbacks.

"There are problems all along the pipeline," said Marty Golubitsky, director of the Mathematical Biosciences Institute (MBI). "New Ph.D.'s are not finding jobs that make use of their extensive training, and consequently graduate programs are admitting fewer students. This stifling of scientific training in our next generation will make it more difficult for the U.S. to remain competitive in the future."

"We knew that the job market for young Ph.D.'s in mathematics was extremely tight this year, but we were astonished by the number and quality of the applicants for these new positions," said Robert Bryant, director of the Mathematical Sciences Research Institute (MSRI) in Berkeley, California. Of the more than 750 applications submitted for the institutes' postdocs, 400 came from people who received their Ph.D. just this year.

"Being able to offer these positions allows us to keep these highly trained people in the workforce and is a great boon for mathematics and for our society," said Bryant.

The impact of this program is widespread, with postdocs working in a dozen states across the country, and in all areas of the mathematical sciences. While continuing their research, the institute postdocs will also apply their training through teaching or industrial partnerships. The following highlights an example from each institute.

Postdocs at the American Institute of Mathematics (AIM) will help to fill a desperate need for math instructors by teaching at De Anza Community College in Cupertino, California, and at San Francisco State University. "I have more than 1,000 students on a waiting list for math classes, and no faculty to teach them," said Jerry Rosenberg, Dean of Physical Sciences, Mathematics, and Engineering at De Anza. Thanks to this initiative, approximately 250 of those students will be able to take a math class from one of the new postdocs at AIM. According to Brian Conrey, executive director of AIM, "We were aware of the dire need for math instructors at California colleges, and we saw the institute postdocs as a way to help address that need. This will bring enthusiastic young instructors into the classroom and allow the postdocs to further develop their teaching skills." Their teaching duties will be in addition to the research they will do under the direction of Stanford University faculty.

Through the Institute for Mathematics and its Applications (IMA) in Minneapolis, Mustafa Tural, who trained in statistics and operations research at the University of North Carolina, will intern at Telcordia Technologies in Piscataway, NJ. He will apply his knowledge to the development of statistical learning methods for creating more efficient algorithms and protocols for communication networks. The project is supervised by Eric van den Berg, who leads a research effort on the analysis of cognitive networks. "We are excited to have Dr. Tural with us. The work he will do here will have an impact on how large mobile ad hoc networks are managed," says van den Berg.

Prashant Athavale, a postdoc from the Institute of Pure and Applied Mathematics (IPAM), will collaborate with scientists at Placental Analytics, a company that studies the effect of placenta structure on fetal development. The placenta can be used to track fetal development, faithfully retaining information about possible prenatal problems and acting as a predictor of adult health risks. The postdoc will apply his training in image processing to study irregularities of placenta structure and develop models of placental vascular branching.

Among the ten postdoctoral NSF fellowships awarded through the Mathematical Sciences Research Institute (MSRI) in Berkeley, California, is Sikimeti Ma'u, originally from Tonga and now a permanent U.S. resident. Sikimeti will pursue research in geometry and topology as a postdoctoral fellow at MSRI in 2009–10. Then her NSF fellowship award will take her to Barnard, which has historic legacy as a college for women, to be mentored by the distinguished topologist Dusa McDuff. "It's a really exciting opportunity," remarked Ma'u, "to be at the MSRI while so many leading mathematicians in the field will be there and to be mentored by one of them. I'm very grateful to the NSF and MSRI."

At the Statistical and Applied Mathematical Sciences Institute (SAMSI), the new postdoctoral fellows will be joining the existing postdoctoral program, as this ensures that the fellows will become involved in highly interdisciplinary research, a potential key for their future employment. The postdoctoral appointments will typically be for two years. For those interested in an eventual academic position, the appointments will involve teaching at one of the partner universities of SAMSI (Duke University, North Carolina State University, and the University of North Carolina at Chapel Hill) to ensure that they will enhance their teaching skills.

Jean-Philippe Lessard, currently a postdoc at Rutgers, The State University of New Jersey, has been selected by the School of Mathematics at the Institute for Advanced Study (IAS) for an appointment at Rutgers beginning in September of 2009. Lessard is developing new techniques to deal with large amounts of data. Complicated problems, such as those arising in biology or engineering, can be modeled on a computer, but the result is often too much data and too little understanding of the essential qualitative behavior of the system. One solution to this problem of data overload comes from algebraic topology, which is traditionally a very pure branch of mathematics. This project concerns an abstract and notoriously difficult-to-calculate notion of algebraic topology—Morse homology, as developed by Morse, Conley, Witten, and Floer. The goal is to make it computable.

Julia Chifman, a postdoc at the Mathematical Biosciences Institute (MBI), will be exploring the genetic relationship between species. Phylogenetics studies the evolutionary history of a group of organisms, for example, the evolution of different forms of the flu virus. These histories can be illustrated through graphs called phylogenetic trees, and Chifman will use her training in algebraic methods to work on the mathematical structure of these trees. Ultimately such studies can lead to more efficient reconstruction algorithms and to new hypotheses for evolutionary biologists to study.

—NSF Mathematical Sciences Institutes news release