For Your Information

Philippe Tondeur Appointed DMS Director

Philippe Tondeur of the University of Illinois, Urbana-Champaign, has been appointed director of the Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF). He will assume his new position in July 1999. He succeeds Donald J. Lewis, who has been director of the DMS since 1995.

"We are delighted that Philippe Tondeur will be the new Division Director for Mathematics at the NSF," said Robert Eisenstein, NSF's assistant director for Mathematical and Physical Sciences. "Like many areas of science and engineering these days, mathematics has entered a golden age. What makes the case for mathematics so central is that, in addition to the discovery potential for new fundamental mathematics, there is the pivotal role that math plays in all areas of science and engineering and business, as well as general education. The responsibilities of the DMS are thus very large, and Philippe Tondeur is a person with the necessary wide and deep vision that will be necessary to accommodate both the excitement and the responsibilities of the field."

Born in Switzerland, Tondeur received his Ph.D. from the University of Zürich in 1961. He has been at Illinois since 1970 and has served as chair of the Department of Mathematics since 1996. His mathematical research has centered on differential geometry and topology and their interactions with mathematical physics. Tondeur is the author of nearly fifty publications, including the book *Foliated Bundles and Characteristic Classes*, written with F. Kamber and published in 1975 in the Springer series Lecture Notes in Mathematics.

—Allyn Jackson

Association for Research in Undergraduate Mathematics Education Formed

The Association for Research in Undergraduate Mathematics Education (ARUME) was formed at the Joint Meeting of the AMS and the Mathematical Association of America (MAA) in San Antonio, Texas, on January 14, 1999. The purpose of ARUME is to foster basic research in undergraduate mathematics education and its application to improving teaching practice. ARUME will provide organizational support for the conduct of research in undergraduate math education and its dissemination through talks, conferences, and publications. It will also interact with teachers of postsecondary mathematics to provide a firm grounding for research efforts within undergraduate teaching. ARUME will maintain a close relationship with the MAA and seek to build relationships with other organizations concerned with the learning and teaching of mathematics.

During the San Antonio meeting, paper and poster sessions addressed a variety of topics, such as students' intuitive number theory rules, preservice teachers' conceptions of variable, the effects of writing on calculus students' understandings of limit, and graduate students' mathematical beliefs.

ARUME will sponsor paper sessions and an expository talk at the MathFest in Providence, Rhode Island, July 31–August 2, 1999. In addition, it is helping to organize the Fourth Annual Conference on Research in Undergraduate Mathematics Education (RUME), to be held September 16–19, 1999, in Chicago, Illinois, sponsored by the Exxon Education Foundation.

Membership in ARUME is open to anyone interested in the pursuit of its goals. For information about membership,

contact David Meel (meel@bgnet.bgsu.edu). Further information on the conference can be found at the Web site http://galois.oxy.edu/mickey/rume99.html or by contacting Mickey McDonald, Mathematics Department, Occidental College, Los Angeles, CA 90041; telephone 323-259-2504.

—From an ARUME announcement

NSF Report Examines Foreign Doctorates' Plans to Remain in United States

A study conducted by the National Science Foundation (NSF) has found that the majority of foreigners receiving science and engineering doctorates in the United States plan to remain in the country. This trend holds across all fields, including the mathematical sciences. The study, entitled "Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plans to Stay in the United States", was released last November.

Between 1988 and 1996, 55,000 students from the major countries of Asia, Europe, and North America (excluding the United States) earned doctoral degrees in science and engineering at United States institutions; the analogous figure for the mathematical sciences is 3,490. (It is useful to keep in mind that, according to the AMS-IMS-MAA Annual Survey, U.S. institutions awarded a total of 8,737 mathematical sciences doctorates from 1988 to 1996.) Of these 55,000 individuals, 63 percent planned to remain in the United States, and 39 percent had firm plans (that is, could provide the name and address of an employer) to stay in the United States; in the mathematical sciences, the figures are 61 percent and 37 percent respectively.

China was the source of many of these doctorates, as well as the source of many of those with plans to stay in the United States. During 1988–96, 1,354 students from China earned doctoral degrees in the mathematical sciences from United States institutions, and of these, 83 percent planned to stay in the United States. Four hundred had firm job offers, 70 percent of them from educational institutions and 26 percent from business or industry.

These trends did not hold for other Asian countries. During this same period, 377 students from South Korea and 376 students from Taiwan received mathematical sciences doctorates in the United States, but only 25 percent and 36 percent respectively planned to remain in the United States. "The trend in the 1990s has been for fewer doctoral recipients from South Korea and Taiwan to remain in the United States because of improved employment opportunities in their home countries," the report states. "However, these trends could change because of deteriorating financial conditions in Asia in 1998."

After China, South Korea, and Taiwan, the countries of Eastern Europe were the largest source of foreign doctorates in the mathematical sciences, accounting for 318, or 9 percent of the total. Of these, 219 planned to remain in the United States, and of the 79 with firm plans to stay, 85 percent had employment offers from educational institutions and 15 percent from business and industry. The picture in Western Europe was quite variable. France accounted for the fewest number of the mathematical sciences doctorates, just 29, whereas Germany had the largest number, 123. The percentage with firm plans to remain in the United States ranged from 6 percent of those from Italy to 37 percent of those from the United Kingdom.

The study found that across all fields of science and engineering the majority of United States employment offers received by foreign science and engineering doctoral recipients was from industry. However, in two fields, biological sciences and mathematical sciences, more job offers were made by educational institutions than by industry. In the mathematical sciences, 75 percent of the job offers were from educational institutions. After noting that 38 percent of foreigners receiving doctorates in computer science had firm job offers from educational institutions, the report states: "Those earning Ph.D.s in mathematics also seemed to be in high demand in the United States; most of their employment offers came from universities."

The report is available on the NSF Web site at http://www.nsf.gov/sbe/srs/nsf99304/.

—Allyn Jackson

Draft NCTM Standards Discussed

In October 1998 the National Council of Teachers of Mathematics (NCTM) released the first draft of the revision of its school mathematics standards, *Principles and Standards for School Mathematics: Discussion Draft*. A session held at the Joint Mathematics Meetings in San Antonio in January 1999 on the new draft document made it clear that many divisions remain over various aspects of the Standards.

When the original NCTM Standards appeared in 1989, their impact was enormous. Not only did they lead to substantial rethinking of school mathematics curricula across the country, but they also led to development of standards for other academic subjects. At the same time, the NCTM Standards ignited a searching debate among mathematicians, K–12 teachers, school administrators, and educational policymakers about what kind of mathematics should be taught at the school level and how it should be taught.

The 1989 Standards addressed mathematics curricula; in subsequent years the NCTM issued two more sets of standards, on assessment and the teaching profession. These three sets of standards are now being revised, updated, and unified in the new document, informally known as Standards 2000. Copies of the draft standards were handed out to the perhaps 100 attendees at the session at the Joint Meetings. It seemed that few had seen the 342-page document before attending the session. The draft may be enjoying wider visibility now that it has been posted on the NCTM Web site.

Joan Ferrini-Mundy opened the session with some general remarks about the standards revision process. Ferrini-Mundy, who is on the faculty of the University of New Hampshire, is the director of the Mathematical Science Education Board of the National Research Council and serves as chair of the Writing Group for Standards 2000. The NCTM has gone to great lengths to collect commentary and ideas from a wide variety of individuals and groups having an interest in mathematics education. Ferrini-Mundy mentioned in particular the Association Review Groups, formed within professional societies and other organizations for the purpose of contributing to the standards revision. The AMS Association Review Group was originally chaired by Roger Howe of Yale University (see "The AMS and Mathematics Education: The Revision of the NCTM Standards", by Roger Howe, and "Reports of AMS Association Resource Group", edited by Howe, both in the February 1998 issue of the *Notices*). The new chair is John Polking of Rice University. Some members of the Standards 2000 writing teams—Judith Roitman of the University of Kansas, Kathleen Heid of Pennsylvania State University, and Alan Schoenfeld of the University of California, Berkeley—also made brief presentations during the session.

The heart of the session was a small group discussion period, during which the audience broke up into groups, each of which focused on a different standard. After the discussion was called to a close, a spokesperson for each group described briefly the group's discussion. For example, Tony Gardiner of the University of Birmingham, United Kingdom, was the spokesperson for a group that discussed the "patterns, functions, and algebra" standard. He commented that the wording seemed to advocate the use of patterns to introduce the concept of a function. For example, students can be given tables or sequences of numbers and asked to guess what the pattern is; in later grades, such patterns would be encapsulated in functional notation. According to Gardiner, this approach was used in the mathematics curriculum adopted in the United Kingdom in 1988, and it backfired. He said that it tended to reinforce the idea that all variables stand for small, positive integers and that it also encouraged students to see an algebraic expression as a kind of "guessed shorthand" for a rule rather than a precise expression with which one can calculate.

Susanna Epp of DePaul University was the spokesperson for the group looking at the standard concerning mathematical proof. She said that clearer distinctions needed to be made between valid and invalid justifications. Consider the difference between a valid informal argument that justifies a statement and a set of examples that illustrates the statement: the first can be extended to a formal proof; the second, perhaps not. She also pointed out the value of open-ended questions in which students are presented with a statement and asked to explain whether the statement is always, sometimes, or never true.

One question raised in the discussion is that of the audience for Standards 2000. As Ferrini-Mundy explained, the Standards are used by many different groups: classroom teachers, curriculum developers, textbook publishers, and policymakers at the local, state, and federal levels, to name just a few. It is difficult to create a set of standards that will suit so many different uses, and as Ferrini-Mundy noted, this is a difficult question the Writing Group has struggled with.

Even if the NCTM succeeds in producing standards that would be useful to such a wide audience, another hard question remains: Are mathematics teachers ready for the changes Standards 2000 calls for? To Howe, this is one of the central problems. After the original NCTM Standards appeared, he asserted, "major errors" were made as school districts adopted new curricula without knowing whether teachers had sufficient background in mathematics to use the new curricula. This problem contributed to the demise of the "New Math" of the 1960s, he pointed out, and has been a significant factor in the rejection in recent years of new curricula introduced in California.

The 80-minute session did not allow for deep or substantive discussion, but interest was clearly high as many remained in the room afterward, engaged in individual discussions. The NCTM has designated the 1998–99 academic year as a "Year of Dialogue" about Standards 2000. In the summer of 1999 the writing teams will meet again to revise the document on the basis of comments received. The final version is scheduled to be released in April 2000. To obtain further information or a copy of the draft revision, write to: Standards 2000 Project, National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 22091; e-mail: `future@nctm.org`. Standards 2000 is available on the World Wide Web at `www.nctm.org/standards2000/`.

—Allyn Jackson

Correction

Due to receipt of incorrect information, misspellings occurred in two dissertation titles appearing in "Doctoral Degrees Conferred", *Notices*, February 1999, p. 255, under Western Michigan University. The corrected entries are:

Crawford, Pamela, Fostering reflective thinking in first-semester calculus students.

Wahlberg, Melanie, The effects of writing assignments on second-semester calculus students' understanding of the limit concept.