Mathematics Opportunities

Math in Moscow Scholarship Program

The Math in Moscow program at the Independent University of Moscow (IUM) was created in 2001 to provide foreign students (primarily from the United States, Canada, and Europe) with a semester-long, mathematically intensive program of study in the Russian tradition of teaching mathematics, the main feature of which has always been the development of a creative approach to studying mathematics from the outset—the emphasis being on problem solving rather than on memorizing theorems. Indeed, discovering mathematics under the guidance of an experienced teacher is the central principle of the IUM, and the Math in Moscow program emphasizes in-depth understanding of carefully selected material rather than broad surveys of large quantities of material. Even in the treatment of the most traditional subjects, students are helped to explore significant connections with contemporary research topics. The IUM is a small, elite institution of higher learning focusing primarily on mathematics which was founded in 1991 at the initiative of a group of well-known Russian research mathematicians who now compose the Academic Council of the university. Today the IUM is one of the leading mathematical centers in Russia. Most of the Math in Moscow program's teachers are internationally recognized research mathematicians, and all of them have considerable teaching experience in English, typically in the United States or Canada. All instruction is in English.

With funding from the National Science Foundation (NSF), the AMS awards five US$9,000 scholarships each semester to U.S. students to attend the Math in Moscow program. To be eligible for the scholarships, students must be either U.S. citizens or enrolled at a U.S. institution at the time they attend the Math in Moscow program. Students must apply separately to the IUM's Math in Moscow program and to the AMS Math in Moscow Scholarship program. Undergraduate or graduate mathematics or computer science majors may apply. The deadlines for applications for the scholarship program are **April 15, 2014**, for the fall 2014 semester and **September 15, 2014**, for the spring 2015 semester.

Information and application forms for Math in Moscow are available on the Web at `http://www.mccme.ru/mathinmoscow` or by writing to: Math in Moscow, P.O. Box 524, Wynnewood, PA 19096; fax: +7095-291-65-01; email: `mim@mccme.ru`. Information and application forms for the AMS scholarships are available on the AMS website at `http://www.ams.org/programs/travel-grants/mimoscow` or by writing to: Math in Moscow Program, Membership and Programs Department, American Mathematical Society, 201 Charles Street, Providence RI 02904-2294; email `student-serv@ams.org`.

Call for Proposals for 2015 NSF-CBMS Regional Conferences

The NSF-CBMS Regional Research Conferences in the Mathematical Sciences are a series of five-day conferences, each of which features a distinguished lecturer delivering ten lectures on a topic of important current research in one sharply focused area of the mathematical sciences. The Conference Board of the Mathematical Sciences (CBMS) publicizes the conferences and administers the resulting publications. Support is provided for about thirty participants at each conference. Proposals should address the unique characteristics of the NSF-CBMS conferences, which can be found at `http://www.nsf.gov/pubs/2013/nsf13550/nsf13550.htm`. The deadline for full proposals is **April 25, 2014**. See the above website for full information.

—From an NSF announcement

DMS Workforce Program in the Mathematical Sciences

The Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF) welcomes proposals for the Workforce Program in the Mathematical Sciences. The long-range goal of the program is increasing the number of well-prepared U.S. citizens, nationals, and permanent residents who successfully pursue careers in the mathematical sciences and in other NSF-supported disciplines. Of primary interest are activities centered on education that broaden participation in the mathematical sciences through research involvement for trainees at the undergraduate through postdoctoral educational levels. The program is particularly interested in activities that

About the cover
Poincaré's glue surface

The cover image is an elaboration of one seen in John Stillwell's review of Jeremy Gray's biography of Poincaré. The original is found in Poincaré's 5th Supplement to "Analysis Situs", one of a series of papers founding algebraic topology. Stillwell calls the figure unenlightening, but we suppose that is a matter of perspective. As anyone familar with Dale Rolfsen's well known book *Knots and Links* will be aware of, it is an example of a Heegaard diagram, a standard tool in 3D topology. Heegaard diagrams are part of the data associated to Heegaard splittings, which remain even now an active topic of research. Alas, it seems that in modern developments few papers on what are called "Heegaard diagrams" actually contain a diagram.

Chapter 9 of Rolfsen's book explains Poincaré's diagram in a series of short exercises. Chapter 6 of Gray's biography contains an impressive account of the 5th Supplement, although one might wish that he had more—and more enlightening—pictures. All we can do here is tell you what exactly you are looking at, and leave detailed interpretation for elsewhere.

The colored region is a surface of genus two that has been cut apart along the circles $\pm$A and $\pm$B. It is the boundary of a *handlebody* of genus two—i.e., a pair of handles attached to a 3-ball. The blue and red paths represent oriented continuous paths on the original surface, and in Poincaré's construction are places where a second handlebody is attached to form his example of a three-manifold with trivial homology but nontrivial fundamental group. The green paths are used by Poincaré to calculate, at the end of §6 of the 5th Supplement, that fundamental group. It turns out that the fundamenetal group is isomorphic to $SL_2(\mathbb{Z}/5)$, although all that he seems to prove is that the icosahedral group A_5 is a homomorphic image.

There are many ways known nowadays of constructing Poincaré's counterexample to an earlier conjecture he had made. One clear presentation can be found in §6 of the classic topology text by Seifert and Threlfall. For a rather more mysterious picture of Heegaard splittings, take a look at

`http://www.its.caltech.edu/~wjiajun/compprog/hfhat/sigma235.html`

—Bill Casselman
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improve recruitment and retention, educational breadth, and professional development.

The submission period for unsolicited proposals is **May 15–June 15, 2014**. For more information and a list of cognizant program directors, see the website `http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503233`.

—From a DMS announcement

NSF Scholarships in Science, Technology, Engineering, and Mathematics

The NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program provides institutions with funds for student scholarships to encourage and enable academically talented students demonstrating financial need to enter the STEM workforce or STEM graduate school following completion of an associate, baccalaureate, or graduate degree in fields of science, technology, engineering, or mathematics. Students to be awarded scholarships must demonstrate academic talent and financial need. S-STEM grants may be made for up to five years and provide individual scholarships of up to US$10,000 per year, depending on financial need. Proposals must be submitted by institutions, which are responsible for selecting the scholarship recipients. The deadline for full proposals is **August 12, 2014**. For more information, see the website `http://www.nsf.gov/pubs/2012/nsf12529/nsf12529.htm`.

—From an NSF announcement

AWM Gweneth Humphreys Award

The Association for Women in Mathematics (AWM) sponsors the Gweneth Humphreys Award to recognize outstanding mentorship activities. This prize will be awarded annually to a mathematics teacher (female or male) who has encouraged female undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. The recipient will receive a cash prize and honorary plaque and will be featured in an article in the AWM newsletter. The award is open to all regardless of nationality and citizenship. Nominees must be living at the time of their nomination.

The deadline for nominations is **April 30, 2014**. For details see `www.awm-math.org`, telephone: 703-934-0163, or email: `awm@awm-math.org`.

—From an AWM announcement