

# University of Iowa Wins Exemplary Program Award

*Allyn Jackson*

*We are happy to get the awards, but we are even happier to watch the students get Ph.D.'s.*

—Philip Kutzko

In the mid-1990s, the mathematics department at the University of Iowa decided to apply for a large government grant to support fellowships for graduate students. The aim was to use the grant to recruit students from minority groups that are underrepresented in mathematics. Eight such students came. Some did well, others less well. One finished a doctorate in the department; others had new doors opened to them: One ended up getting an MBA, and another earned a Ph.D. in computer science. But the department did not stop there. Rather, faculty members got to know the students and tried to understand the factors behind their achievements and setbacks. The experience of bringing in those eight students put the department on a new path. “What happened as a result of that first year or two is, we began to change as a department,” says Iowa faculty member Philip Kutzko. “It’s a bit funny to say it this way, but we started to become a little less white.”

Nowadays if you ask members of the Iowa department about their minority students, they can hardly stop rattling off the success stories. There is Juan Ariel Ortiz, who came from the University of Puerto Rico at Humacao, fell in love with topology, and is now a postdoc at the University of Rochester. There is Sara del Valle, who was a recent immigrant from Mexico with limited English skills but tremendous intelligence, and who now holds a Ph.D. and is on the permanent faculty at Los Alamos National Laboratory. Among the current students is Paulette Willis, an African-American from New Orleans whom Kutzko says is one of the strongest students in the department. Willis has passed all of her exams and is now working on her dissertation under the direction of Paul

Muhly. Although clearly on track to a successful research career, she is still sometimes beset by anxieties that stem from having so few role models. “I have never seen any black people do this,” she told Kutzko.

Over the years, the Iowa department has listened carefully to its students and has observed closely their successes and failures. The department has used this knowledge to rejuvenate its graduate program, making it a place where students of all colors can thrive. The department has received several awards for its success in recruiting minority students, including the 2004 Presidential Award for Science and Engineering Mentoring and designation as a “Program that Makes a Difference” by the AMS Committee on the Profession. This year, the Iowa department was chosen for the AMS Award for Exemplary Program or Achievement by a Mathematics Department.

## **Mentoring is Key to Success**

*It’s an attitude of, “It’s our job to make sure everybody succeeds,” as opposed to, “It’s our job to find out who the best students are.”*

—David Manderscheid

Over the past decade, the University of Iowa mathematics department produced about 1 percent of the total number of doctorates granted in the U.S., and about 4 percent of those granted to students who are members of underrepresented minorities. During that time, twelve minority students received Ph.D.’s at Iowa. Today about a quarter of the department’s approximately 115 graduate students are minority, and about 40 percent are women. Because the department’s retention rate has risen so much in recent years, more success stories are surely on the way. Before the minority recruitment initiative, the Iowa graduate student

population was dominated by international students. Today, the majority are American.

The commitment that the department made to the minority students who started arriving in substantial numbers in the mid-1990s inspired a transformation of the department's basic philosophy. As department chair Yi Li explains it, "The old business-as-usual would be: Okay, you come to our program, that's it. If you study and you do well, that's okay; if you don't do well, you leave." At Iowa, this you're-on-your-own, sink-or-swim attitude has been replaced by one that puts student success as the top priority. With this student-centered attitude has also come a new spirit of inquiry that has allowed the department to analyze critically its graduate program to address trouble spots and make changes.

One of the most important changes has been the institution of a mentoring program. Every new student is assigned, or is allowed to choose, a mentor from among the department's faculty. The mentor is usually a person different from the thesis advisor—someone with whom the student can discuss a wide range of problems, from difficulties fitting in with other students, to lack of background in a particular mathematical area. "Having seen the impact and having seen what a broad change it brought to our program, I am a firm believer of mentoring early and in time," says Li. He noted that it is particularly important that students have a mentor from the very beginning of their graduate studies, so that problems are not left to fester. Many students come from smaller schools where the instruction in mathematics was not as rigorous as in a Ph.D. department like the one at Iowa, and the change can be a shock even for highly talented and motivated students. Proper guidance in the early stages can make a big difference.

After each midterm examination in the first-year graduate courses, the results are sent to the department's Graduate Committee, which identifies students who seem to be struggling. That information is then passed along to the mentors, who talk to the students about what might have caused poor performance on the exams. "We are trying to help the students as much as we can and to find out, if they are not performing, what the problem is," explains Li. "There may be a cultural problem, maybe homesickness, other personal problems, or language problems." The mentors also try to determine if some part of the student's mathematical background is lacking or needs shoring up. In addition, the mentoring system helps build support for the minority program across the whole department: Helping the students they mentor succeed has built faculty members' loyalty to the program. Says Li, "We all see that this is a great thing for the department, for the students, and for the educational purpose."

## Building Community

*Iowa is largely a white population...so for a minority student to be at Iowa, isolated, would be very difficult. We try to build a community so that they feel at ease, at home, so they have a sense of belonging.*

—Yi Li

One of the hallmarks of the Iowa department is the strong sense of community that has developed, and this happened in large part as a result of the minority program. "Before we started bringing in minority students, the graduate students were not a very cohesive group," says faculty member Juan Gatica. "They didn't work together; they kept pretty much to themselves. When we started bringing in minority students, we asked them to get together and have study groups, and the non-minority students started participating in this too. It was a surprise that this became a big movement in the department and transformed it in many ways." There are now study groups for algebra, analysis, topology, and other topics, as well as exam-preparation study groups.

Another strategy to build community sounds mundane but made a big difference: Replacing the worn-out 1970s vinyl furniture in the department lounge. "I think one of the most brilliant things I did as department chair was getting new furniture for our lounge," says David Manderscheid, who was on the faculty at Iowa for twenty years before taking a position as the dean of the College of Arts & Sciences at the University of Nebraska in 2007. "It sounds sort of silly, and my dean thought it was sort of silly when I proposed it to her. But I really pushed it. It made the lounge a comfortable place for the students and faculty to hang out." The lounge is now the heart of the department, where faculty and students can meet informally and where coffee and cookies are served every afternoon. The department used to keep the lounge open only until 5 p.m. but now keeps it open until 11 p.m., as a way of encouraging students to gather and study together. On the way home in the evening, faculty often pass through the lounge and stop to talk to the students or to help with mathematical questions.

Also reinforcing a cohesive community among the students are recent changes to the graduate program. When the department decided to apply for a VIGRE (Vertically Integrated Research and Education) grant from the National Science Foundation, it gave a lot of thought to the VIGRE requirement that departments get students involved in research early on in their graduate studies. What emerged, along with a successful proposal, was a new structure for the graduate program. Previously, students took a couple of years' worth of graduate courses with the aim of passing the

comprehensive examination as the gateway to starting research. Now, all students now must take a standard set of first-year graduate courses in analysis, topology, and differential equations, and in either algebra or numerical analysis. If students are not prepared to jump into these courses right away, they can take undergraduate-level courses to build the necessary background. Once finished with the first-year courses, students must take a qualifying examination on the material covered. After that they can start doing reading courses with an advisor, take advanced graduate courses, and prepare for the comprehensive examination. This new structure, with its clearer timetable, gets students into research more quickly.

Having students take all the first-year courses together has reinforced the community bonds. "They know each other much better because they are all taking these core courses, they study together, they help each other, they lecture to each other," says Li. "You will see them standing in front of blackboards, teaching each other. They develop a very active semi-research activity already" in their initial studies. In addition, students rose to the challenge of the new and tougher degree requirements. "People were concerned" about this change, says Manderscheid. "Would it have a negative impact on our minority students?" In fact the opposite happened: Students did better under the new system, in which expectations and milestones are clearly laid out. "Students were getting more feedback more quickly, and they loved it," notes Manderscheid.

In another innovative twist, the department started hiring third- and fourth-year graduate students to be teaching assistants in recitation sections in the first-year graduate courses. Not only does the extra instruction help the students, but the TAs serve as peer mentors to the younger students, further enhancing the sense of community in the department. The Iowa faculty are quick to point out that the changes inspired by the minority program have boosted the success of all students, minority, majority, and international. "These programs are always designed for the benefit of all of our students," says Manderscheid.

## Developing a Path into Mathematics

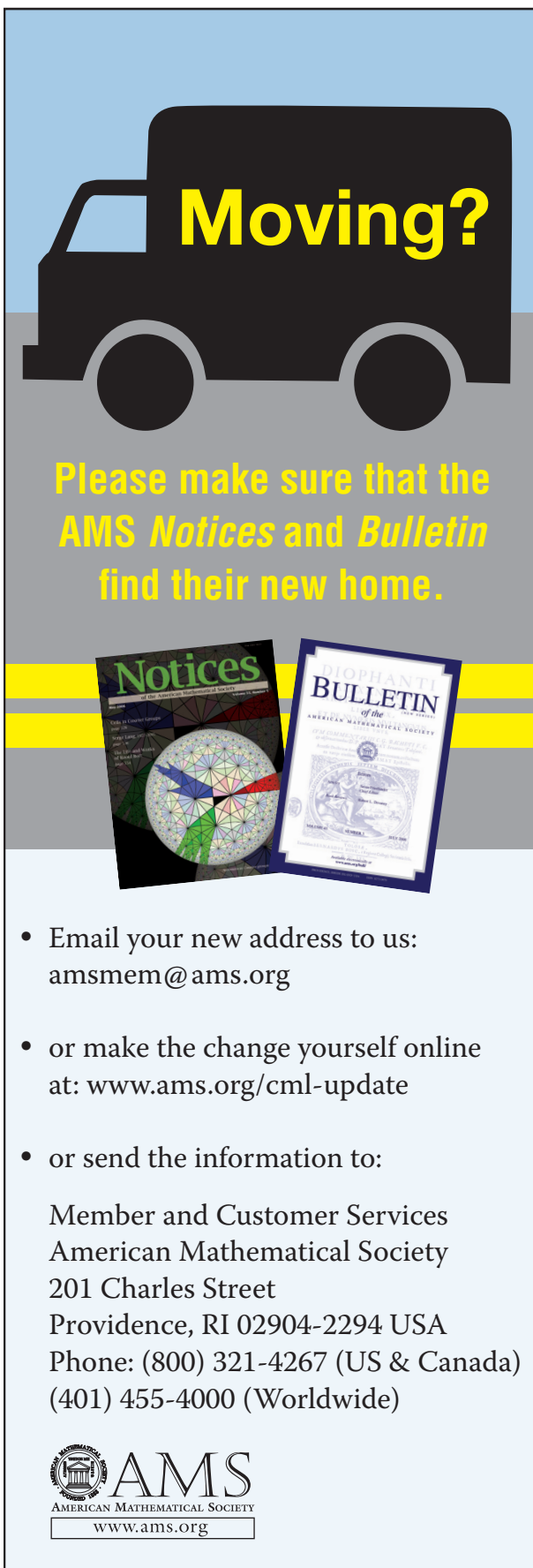
*I remember one of our faculty members was slow to become involved in our initiative. Then he mentored during our summer program, and I remember him getting up and saying at the closing ceremonies, to all of these mostly African-American kids, "I want to thank you for reminding me why I came into this profession."*

—Philip Kutzko

The department has several ways of opening paths into graduate study in mathematics. One is its NSF-funded Alliance program, a collaborative effort of the mathematical sciences departments at the University of Iowa, Iowa State University, and the University of Northern Iowa, together with the mathematics departments at fifteen to twenty minority-serving institutions around the nation. Through the Alliance, students at the minority-serving schools are mentored by local faculty and by faculty in Iowa, and they also can attend the summer Research Experiences for Undergraduates program run by the three Iowa schools. The University of Iowa department also has the Heartland Partnership program, which has a structure similar to the Alliance and serves twelve small colleges in Iowa and surrounding states. Finally, the department's VIGRE grant supports undergraduates attending the summertime REU. In addition to giving undergraduate math majors a taste of research, these programs cultivate a diverse talent pool that is on track to graduate school in mathematics, whether at the University of Iowa or elsewhere.


When minority students apply to graduate school at Iowa, their applications are carefully studied by the department's Minority Recruitment and Development Committee, currently chaired by Gatica. This committee has over the years gained a lot of experience and skill in identifying students who have the potential to succeed in the graduate program. Picking students "is a hard job, and we are getting pretty good at that now," says Kutzko. "There are students who we know won't fit standard profiles but who we are pretty sure are going to succeed." Since the department has developed a reputation as a place with a supportive environment in which students flourish, it has started to receive applications from students with very strong backgrounds who would be able to get into the top schools in the country. While this is a clear boon for the department, the Minority Committee does not choose to take the easy path. Says Kutzko, "If we start resting on our laurels now and only accept black and Latino kids from elite institutions, because they want to come to graduate school at a comfortable place, we are not going to accomplish what our ultimate goal is, which is to change the population who do mathematics." The department wants to remain a place where high-potential students with non-standard backgrounds are welcome and can excel.

With the success of its minority program, the department has found its esteem rising within the university. It has also helped other departments on campus to launch recruitment programs of their own. The national recognition the department has garnered has opened the door for collaborations with other mathematics departments interested in enhancing the achievement of minority students.



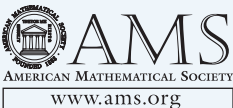
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It has also helped the department to attract high-quality faculty members. For example, the department recently hired Julianna Tymoczko, who earned a Ph.D. from Princeton in 2003. She was a Clay Mathematics Institute Liftoff Fellow as well as an NSF Postdoctoral Fellow. Says Manderscheid, “The fact that Iowa has this very active, vibrant graduate program that is doing things differently I think made the difference” to Tymoczko in deciding where to take a permanent job.

### A Harmonious Department

*The opportunity that this department has afforded me [to work in the minority program] has been invaluable. It has transformed my life and given me great satisfaction.*

—Juan Gatica

One perhaps surprising fact about the faculty in the Iowa mathematics department is that it does not have a large minority presence: Less than 10 percent, three out of forty, are members of underrepresented minorities. Furthermore, the Iowa minority program has not been based on the model of a single charismatic figure who serves as a magnet for students. Rather, it has been a communal effort of the department—and the whole department has benefited. “This was a place that had its political troubles before we started doing this,” says Kutzko. “I think now we are a department that has a harmony to it that is very, very rare.”

For the faculty who have been directly involved in the minority program, the personal satisfaction has been enormous. “It’s energizing,” says Manderscheid. “It made me enthused. It made me want to come to work every day! Because I saw what great things we were doing, and I saw how we were giving opportunities to students who wouldn’t go to graduate school otherwise.”