

STRATEGIC ASSESSMENT OF MATHEMATICS AND AMCS GRADUATE PROGRAMS

SEPTEMBER 2009

The Mathematics Department and the Applied Mathematical and Computational Sciences (AMCS) Program are writing a joint strategic assessment because AMCS students complete their core sequence of courses in the Mathematics Department and their TA support is through the Mathematics Department. Therefore we are adding one additional page as allowed.

These are exciting times for the Mathematics and AMCS Graduate Programs. In 2006 we received a \$3 million NSF VIGRE Grant which supports annually seven RAs, six undergraduate RAs, and several postdocs, the Heartland Partnership, and a summer Research Experience for Undergraduates. The grant was renewed this summer and runs through summer 2011. In 2004 we received one of fourteen Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM), in 2005 we were one of two graduate programs awarded the American Mathematical Society's (AMS) Programs that Make a Difference Award, and we recently received one of the most prestigious awards of its kind, the 2008 AMS Award for an Exemplary Program or Achievement in a Mathematics Department. The award cites the department as "a national leader in recruiting and developing underrepresented U.S. minority doctoral students in mathematics". We have been very successful in receiving GAANN grants; we just received a new GAANN grant. We recruit a diverse group of students which includes Native Americans, Pacific Islanders, African-Americans, and Hispanics. For 2004-2009 we had fifteen students accept Presidential Fellowships-the most of any program. In 2006 Marius Ionescu won the Spriestersbach Dissertation Prize. The department is noted for its excellent teaching assistants. We routinely have the largest number of TAs winning The Outstanding Teaching Assistant Award (twenty-three over the last five years).

AMCS is a broad-based interdisciplinary Ph.D. program for students desiring to study mathematics and a companion science so that they can apply their mathematical skills to significant scientific problems. The main goal of the program is to develop applied mathematicians with sufficient professional experience and versatility to meet the research, teaching, and industrial needs of our technology-based society. While building a base in the Mathematical Sciences, students acquire skills in another area of their own interest, chosen from the behavioral, biological, business, engineering, medical, physical, or social science areas. Because of expertise present at the University of Iowa in such fields as numerical analysis, mathematical programming, parallel and vector processing, hydraulics and fluid mechanics, heat transfer, dynamic simulation of mechanical systems, optimization in management sciences and industrial engineering, discrete event simulation, robotics, atmospheric and

environmental studies, climate/chemistry modeling, geographical decision making, theoretical and plasma physics, and pharmacological and biological modeling and simulation, the computational sciences are now an important part of the program. There is a demand for mathematical scientists who are trained to use a computational sciences approach in relevant problems. The program has fifty-nine affiliated faculty from fourteen different departments who are working on exciting research projects and are eager to train students.

MISSION STATEMENT

Our programs prepare our graduate students to become the next generation of mathematicians and mathematical scientists. We provide training for those who will become active scholars in colleges and universities and for those who will excel in business, industry, or government.

Our graduate students provide important instruction for undergraduate students and staff the Mathematics Tutorial Lab. Our programs outreach to high schools and colleges throughout the state through various activities such as Sonya Kovalevsky Day (for high school girls), a high school mathematics contest, a collegiate modeling contest, and through the Heartland Partnership which includes the following Iowa colleges: Central, Clarke, Coe, Cornell, Grinnell, Loras, Luther, Simpson, and Wartburg. Our graduates are in high demand by colleges throughout the state.

ADMISSION PROCESSS AND CRITERIA

The number of applications for graduate study in mathematics and AMCS has been steadily increasing. We expect about 150 applications this year for our roughly twenty positions. Many fine applicants are not admitted because we only admit students with full support and give preference to those desiring a Ph.D.

Admission for Mathematics is done by the Mathematics Graduate Committee and admission to AMCS is done by the Director of AMCS. TA support for students of both programs is determined by the Mathematics Graduate Committee. Criteria for selection include grades (both overall and in relevant courses), GRE scores (neither program requires the subject test), TOEFL scores for international students, letters of recommendation (three required), and the student's personal statement. Minority applications are first screened by the Minority Recruitment and Development Committee which makes admission recommendations to Mathematics and AMCS.

We have been successful in enrolling the highest quality students admitted, but not as successful as we would like. Our enrolled students have both grade points and GRE scores well above the University's average. Over 50% of admitted students enroll, but we would like this to be 100%. Perhaps our biggest problem is getting admitted students to visit Iowa. From past experience we know that if

we can get admitted students to attend our visit weekend in late March, they will likely choose Iowa over a peer institution.

We have been extremely successful in enrolling a diverse student cohort. We have consistently been above the national average for percentage of female students and are one of the national leaders in enrolling and graduating minority students. Indeed, over thirty percent of our students are female and over twenty percent of our students are under-represented minorities. About twenty-five percent of our students are international students.

PROGRAM SIZE AND GRADUATE STUDENT SUPPORT

The current size of both the Mathematics and AMCS program is appropriate. However, to maintain this size it is imperative that upcoming positions in Mathematics due to retirements be filled.

With very rare exceptions we only admit students with full support (a 50% TA, RA or fellowship). In recent years we have admitted very few students desiring a terminal MS degree. Our support commitment is for the first year, but with the understanding that it is renewable for a total of six years for the Ph.D. program (seven years for minority students) upon suitable well defined progress spelled out in the Graduate Student Handbook. Support for the sixth year is contingent upon recommendation of the student's thesis advisor.

Besides having advisors, graduate students are assigned faculty mentors who do this on an overload basis. The Minority Recruitment and Development Committee is involved in mentoring minority students.

Mathematics is in the sixth year of its new curriculum and AMCS in the fourth year of its new curriculum. This new curriculum was developed as part of our VIGRE proposal. While we feel the new curriculum will slightly decrease the time towards Ph.D., its main purpose was to get students into research more rapidly. The average time to degree is 5.9 years for Mathematics (which is about one-half year below the national average) and 6.9 years for AMCS. The longer time for AMCS is due to the fact that some students accept internships before they graduate.

Every year Mathematics and AMCS nominate students for the Presidential Fellowships and Dean's Fellowships. To be eligible for departmental summer support, post comp Mathematics students are required to apply for the Graduate College's Summer Fellowships. We have had several federal grants providing fellowships for minority students including GAANN grants and AGEP. Our VIGRE grant gives support for seven graduate traineeships a year for five years. Several graduate students are supported on individual investigators' NSA or NSF grants.

PROGRAM OUTCOMES

Our students compete very successfully for teaching awards at Iowa. Twenty-three of our students have won Outstanding Teaching Assistant Awards during the past five years. Marius Ionescu won the 2006 Spriestersbach Dissertation Prize. We also had winners in 2000, 1998, and 1983.

Appropriate placements for our students include academic teaching and research positions and positions in business, government, and industry. We have 100% placement of our recent students with most students receiving multiple job offers. Recent graduates have taken jobs at four year liberal arts colleges (for example Dickinson, Grinnell, Mount Mercy, North Central College, Upper Iowa), state colleges and universities some with Masters programs (for example Cal State-San Bernadino, Cal State-Fresno, Georgia Southern, Murray State, Northern Michigan University, Shippensburg University, Wisconsin-La Crosse, Worcester State), private universities (for example Pepperdine), postdocs (for example Cambridge, Dartmouth, LSU, Purdue, Ohio State, Rutgers, Seoul National University, University of California-San Diego, University of Connecticut, University of Minnesota, University of Nebraska) and in industry (for example Goldman Sachs, Los Alamos National Laboratory, Motorola, Sprint). In the past the bulk of our students have taken jobs at four year liberal arts colleges or at non-flagship state universities such as University of Wisconsin at La Crosse, University of Wisconsin at Oshkosh, or Truman State University. As part of our VIGRE grant we are trying to get a higher percentage of our students to take postdocs.

CONCLUSION

The graduate programs in Mathematics and AMCS are up and coming, vibrant programs that are central to the mission of the University. We are nationally known for our success with underrepresented minorities. We feel that the VIGRE grant will allow us to reach the next level. We have a diverse student body that is engaged in a collaborative learning atmosphere. A strength of our programs is the quality of the students enrolled. While we believe that the current size of our programs is proper, it is imperative that faculty vacancies be filled. While we have very good placement of our students, we desire to place more students in postdoc positions.