



## Department of Mathematics

### THE POWER

The Department of Mathematics is an internationally recognized leader in mathematical research and mathematical instruction innovation—particularly for its developments in inquiry-based learning, calculus, and its postdoctoral training, with the largest program of any university mathematics department in the country. The extent and commitment to inquiry based learning, to the undergraduate research experience, and to the professional development of its graduate students and postdoctoral assistant professors sets the department apart. Moreover, for over 85 years, the Department of Mathematics has been one of the world's premier research centers, consistently ranked in the top 10 and noted for the depth and breadth of its research and many important innovations. The challenge ahead is to maintain, in an extremely competitive environment, the quality of the department's research and instructional program, while simultaneously becoming increasingly interdisciplinary, so that its faculty can play leading roles in research endeavors in other disciplines—a development that is characterizing research in the 21st century. Our goal is to be recognized as one of the top five mathematics departments in the country, both for excellence in education and in research.

## THE OPPORTUNITIES

Our faculty and students contribute to expanding the knowledge of fundamental mathematics and its uses in other disciplines. While mathematics was once the province of a few, it has now become an essential component for many livelihoods. The department enrolls over 10,000 students annually in its elementary programs and provides them with the foundation for their studies at the university. While undergraduate mathematics majors receive a thorough grounding in mathematics and its applications, our graduate students are well prepared for research and for a teaching career, and our postdoctoral assistant professors receive the career foundation and training that will help them shape the next generation of mathematicians. The department plays an important role in community outreach as well. U-M Mathematics has recently established a Math Circle that brings area middle and high school students to the department to work with our faculty and graduate students. The department also manages the very successful Michigan Math and Science Scholars (MMSS) Program, which brings intensive study of mathematics and science to high school students during the summer.

## THE IMPACT

To maintain its leadership role in research, expand its interdisciplinary programs, and enhance the student learning environment, the department depends heavily upon financial support from alumni and friends. The department must build on its strengths and ensure that gifted students have scholarship funds and faculty members have the resources they need to pursue research and offer an innovative curriculum. Also, our Inquiry Based Learning (IBL) program, the AIM (Applied and Interdisciplinary Mathematics) program, and our renowned actuarial program need support to continue to flourish so future generations of students and faculty can benefit from them.

### Center for Inquiry Based Learning (IBL) Fund

*\$5M endowed / \$200,000 annually*

In courses with an Inquiry Based Learning component, students discover some of the material they need to learn themselves—in this way they are introduced to the research experience and acquire a deeper understanding of the subject matter than can be obtained from having someone else present the theory and methods to them. IBL develops inquiry based learning and supports training of faculty, postdoctoral fellows and graduate students in IBL teaching. Our goal for the IBL fund is to help meet current expenditures, including those described below, as well as to raise a permanent endowment.

- Curriculum development: **\$50,000 annually**
- Postdoctoral faculty teaching: **\$100,000 annually** will help fund a postdoctoral faculty member to teach students using the IBL methods
- Graduate student instructors: **\$30,000 annually** will sponsor a graduate student to assist in teaching an IBL course
- Undergraduate course assistants: **\$20,000 annually** to sponsor several undergraduate students to assist faculty in teaching IBL courses

## Center for Risk Analysis

*\$5M endowed*

For over 100 years, the department has been one of the nation's leaders in instruction and research in actuarial mathematics, with a very distinguished group of alumni. Looking to the future needs of society, the department has expanded this program to include a wider range of problems where risk is an essential element. In addition to insurance and pensions, instruction is provided in mathematics of finance, including derivatives, long-term investments, regulation of financial markets, and the fundamental techniques of stochastic control. As part of this initiative, the Department of Mathematics, in conjunction with the Department of Statistics, has recently established a Quantitative Finance and Risk Management Master's degree. To continue to develop this highly interdisciplinary program, the department must be able to recruit outstanding faculty, many times competing with much more lucrative careers in the financial industry. Hence, it is necessary to provide faculty retention incentives, and be able to offer scholarships and fellowships to attract the most talented students and postdoctoral faculty. Endowing these awards will assure that the department is an innovator in the field and is able to provide talented graduates who build successful careers in various fields for years to come. In the past, the department has hosted very successful conferences and workshops in this area, and to maintain leadership in the field, should continue to offer such activities in the future. Support needed for the Center for Risk Analysis includes:

- Graduate and Postdoctoral fellowships: **\$1M endowed; \$50,000 annually per recipient**
- Undergraduate scholarships: **\$100,000 endowed; \$5,000 annually per student**
- Endowed professorship (**\$3M endowed**) would be the catalyst to create an interdisciplinary center with the potential to attract additional faculty to conduct research in risk analysis.
- Faculty recruitment and retention (**\$2M endowed**) would provide funding to compete with industry as well as more lucrative academic positions in business and finance.
- Support of an annual workshop on subjects related to Risk Analysis and Management: **\$50,000 annually**

## Applied and Interdisciplinary Mathematics Program (AIM)

*\$3M endowed / \$50,000 to \$100,000 annually*

This doctoral degree program, which requires students to complete extensive course work in another discipline, is attracting a substantial number of bright students who are pursuing innovative research in various fields including: Mathematical Physics (Fluid Dynamics, String Theory), Modeling in Engineering (Materials, Aeronautics, Control Theory), Mathematical Biology (Epidemiology, Cancer, Fluid Mechanics), Informatics (Algorithms, Theoretical Computer Science), Risk Analysis (Insurance, Financial Engineering, Health, Contamination), and Mathematical Economics. This program maintains a vital link between mathematics and the life sciences initiative. To expand the program, we need additional funding for this area that an endowment would make possible.

## **Named Professorship**

*\$3M endowed*

To maintain its leadership in research and teaching, the department needs to retain current faculty and to continue recruiting at the highest level in a fiercely competitive environment. An endowment of \$3 million would provide a competitive annual salary for a distinguished professor and a supplemental research fund. We seek endowed professorships for both theoretical mathematics and applied mathematics.

## **Named Professorship in Actuarial Science**

*\$3M endowed*

It has been challenging to recruit and retain outstanding faculty members in the area of actuarial mathematics. The academic field is already a fiercely competitive environment, and in this area of study, we compete with much more lucrative positions in industry. An endowment of \$3 million would provide a competitive annual salary for a distinguished and experienced faculty member with experience in the actuarial field. An endowed professorship in this area will maintain and enhance our existing strong program.

## **Named Postdoctoral Assistant Professorship**

*\$1.5M endowed*

Postdoctoral faculty play a vital role in refreshing the program with new ideas and research. At the same time, the department provides outstanding mentoring for these new researchers both in research expertise and educational methods. In learning new approaches to teaching and research, these young scholars have much to offer current students. External funding is needed to attract the brightest new and recent Ph.Ds.

## **Graduate Student Fellowships**

*\$1M endowed / \$50,000 annually*

Very talented students are essential for a top quality department, and competition for them is intense. Department funding for graduate students is becoming more limited. Attracting the top students assures that our program will thrive and graduates will be prepared to contribute to the mathematical community.

## **Area Specific Research Initiative Funds**

*\$1M endowed / \$50,000 annually*

Faculty often have research expenses that cannot be covered by conventional sources. These include funding for graduate students to work on research projects, computing costs, conference activities, travel, and research related items. Endowed funds may be named.

## **Fund for Innovation in Mathematics**

*\$1M to \$2M endowed / \$50,000 to \$100,000 annually*

Project-specific funding is crucial in the retention and recruitment of faculty who are at the cutting-edge of innovation. The department must be able to provide seed funding for faculty development and research projects encompassing students and postdoctoral faculty. The Innovation Fund would allow the department to meet unexpected challenges quickly to retain outstanding scientists well into the future. Funding could be used for new faculty start-up packages, computer packages at the higher end of technology, and postdoctoral support as well as graduate student funding. The fund could also be used to sponsor faculty grants for research and training workshops that are regularly held in the department.

## **Michigan Center for Applied and Interdisciplinary Mathematics (MCAIM)**

*\$1M endowed / \$50,000 annually*

MCAIM was established in 2016 with the broad aim of serving as the focal point for activities that integrate mathematics with the sciences across the University of Michigan. It currently operates within the Department of Mathematics and will organize yearly themes. MCAIM will sponsor the Van Loo Postdoctoral Fellowship Program, present topical workshops to identify and explore issues at the forefront of applied mathematics, hold advanced summer schools for graduate students and postdoctoral fellows, and host a short-term visitors program. The center also strives to promote applied mathematical research at Michigan by other means, such as aiding searches for external funding and facilitating collaborative interactions. Funding will also support conferences, workshops, and fellowships.

## **Undergraduate Scholarships**

*\$200,000 endowed / \$10,000 to \$50,000 annually*

Attracting bright undergraduate students to the department and to the university is essential to achieving excellence in mathematics education. Providing assistance to outstanding students not only benefits the students, it strengthens our program and our ability to provide future productive members of society with the most competitive skills. Named undergraduate scholarships can be funded by endowments of \$200,000. Funding these scholarships is a high priority.

## **Mathematics Education Fund**

*\$50,000 to \$100,000 annually*

In collaboration with the School of Education, the Department of Mathematics teaches the core mathematics background needed to become a successful K-12 teacher. This fund will help us continue to attract and retain distinguished senior faculty in this area. Our goal is to create a national model of excellence in mathematics education. Additionally, the fund provides training opportunities for postdoctoral faculty and graduate students, both in mathematics and education, and provides scholarships for both undergraduates and graduate students involved in math education, development of new courses and revising curricula of existing ones and in assessing the program.

## **Distinguished Lectures**

*\$10,000 to \$50,000 annually*

To keep current with groundbreaking research developments, it is essential for the department to invite those making innovative discoveries to campus to give presentations and be available for consultation. These could be a series of lectures or a single lecture from a renowned scholar in the field.

## **Mathematics Strategic Fund**

*\$10,000 to \$50,000 annually*

Each year, the department faces unexpected opportunities to extend its mission that are not funded by the standard state budgeting process. An expendable account allows the department to respond to such opportunities and address unexpected special needs. It also provides the department chair with resources that can support exceptional cutting-edge work that will have a high impact on mathematics, our students, or our department.

## **Research Experiences for Undergraduates**

*\$6,000 per student*

Each summer the department's Research Experiences for Undergraduates (REU) program gives students an authentic taste of what it is to "do mathematics." Paired with a faculty member, students work on research problems that are at the frontiers of the mathematical sciences. Students frequently report that participating in an REU was a high point of their undergraduate experience at Michigan. Each contribution of \$6,000 will support one undergraduate student for a summer of research experiences.

## Curtis E. Huntington Honorary Fund for Actuarial Activities

### *Ongoing*

The Actuarial Program at University of Michigan is one of 23 programs world-wide that is recognized by the Society of Actuaries as a Center of Actuarial Excellence. The Curtis E. Huntington Honorary Fund was established to maintain our program as the best in the world. Uses for the fund include support for student group activities and payment of actuarial exam fees for our undergraduates, which totals approximately \$10,000 each year. Additionally, the fund could benefit career support and recruitment activities for undergraduate and graduate students, student recruitment activities, and incentives to attract top students and faculty. Another goal of the fund is to provide innovative program initiatives that build bridges between the academic and practitioner communities, students and alumni, and faculty across the disciplines. A gift to the Huntington Fund will help assure a future of excellence for our Actuarial and Financial Mathematics Program.

### **WAYS TO FUND YOUR GIFT**

Your gifts of cash, pledges, or appreciated securities change lives. Wills, estate, and planned gifts allow you to create a lasting legacy that will enable the best and brightest minds to experience a liberal arts education, solve problems in a changing world, and yield ideas and innovations that will make a difference in Michigan and around the globe.

### **[GIVE ONLINE NOW](#)**

Your one-time gift of any amount supports our programs and student experiences. We are working together to reimagine the world and create positive, purposeful change.

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### CONTACT INFO

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