

Mathematics Department

Illinois State University

FY22 Annual Report

March 17, 2022

The Mathematics Department continues to maintain excellence in its programs and continues to make progress on a number of initiatives. While in the Fall of 2021 we worked on the University's goal of transitioning back to a more normal college experience for our students, we continue to try to more fully understand and react to the fallout of student learning experiences during the time of COVID-19 mitigations. This is especially relevant as we consider efforts to improve student success not only within our major, but throughout our courses given how many credit hours we generate each year (about 1 out of every 8 credit hours generated in the College of Arts and Sciences). In addition, we are also adjusting to being able to devote more time to other things besides making adjustments for COVID-19 mitigations.

This fiscal year, we are happy that we had conducted two searches for tenure-track positions and successfully hired our top choice in each search. To balance that, Distinguished Professor Saad El-Zanati retired in August. We are also anticipating one or two more retirements by the end of this fiscal year. As such, we continue to experience a shortage of tenure-line faculty in the Department with overloads for tenure-line faculty becoming a necessity to cover the courses are students need in their programs. The extent in which this is happening every semester has become an issue of concern for the Department. The bottom line is we do not have enough faculty to be able to offer all the courses we need to offer and we continue to ask for authorization to hire more faculty. This need is becoming more acute as we roll out our new Data Science/Computational Mathematics sequence in our bachelor's program, as we look to supporting the new College of Engineering, and as the University looks to build upon our Data Science/Computational Mathematics sequence to create a larger and more interdisciplinary program in data science. We see ourselves as integral partners in supporting these initiatives.

Other initiatives that are moving forward are the maintaining of our Actuarial Science status as a Center of Actuarial Excellence, recognizing ISU as one of the top actuarial programs in the world, we are ready to launch our online actuarial masters program in the Fall of 2022, and we continue to work with international partners to strengthen our partnerships and forge additional partnerships. In addition, we are moving our Elementary and Middle School Mathematics Education sequence in our M.S. program online to better meet the needs of current teachers looking for further educational opportunities. We continue our summer programs such as the NSF-sponsored Research Experiences for Undergraduates program and the Midwest High School Scholars Analytics Academy. We continue our work with Shanghai Normal University – Tianhua College, offering our courses to a third cohort of students there.

We have also been approached by a representative of another university in the Shanghai area about another potential partnership that we are currently investigating.

- I. Accomplishments and Productivity for FY22
 - a. CAS Specific Accomplishments
 - i. Passed a new Data Science/Computational Mathematics sequence as part of our Bachelor's program. We believe this is an exciting new program that will attract a significant number of majors.
 - ii. We passed our annual review as a Center of Actuarial Excellence, affirming ISU as an international leader in Actuarial Science programs.
 - iii. Our mathematics teacher education program received a reauthorization with distinction as part of our Illinois Educator Preparation Profile with a score of 88.4%.
 - iv. We conducted two successful searches for our open Tenure-track positions, one in Applied Mathematics and the other in Middle Level Mathematics Education, hiring our top choice for each search.
 - v. Mathematics continued to increase its credit hour generation to 31,653 credit hours for FY21, which is an increase from both FY19 and FY20 credit hour generation. We continue to be the unit generating the largest number of credit hours in the University, generating about 1 out of every 8 credit hours generated by CAS.
 - b. Mathematics Department Goals for FY22
 - i. Supporting Faculty and Student Success through hiring more Tenure-Track faculty
 - ii. Improve Student Success through Re-Examination of Entry Level Courses
 - iii. Establish a Data Science/Computational Mathematics Bachelor's Sequence
 - iv. Launch the Online Actuarial Masters Program and Establish a Foundation for Other Online Graduate Programs.
 - v. Use Visiting Faculty as a temporary measure to meet instructional needs while enhancing student and faculty success
 - vi. Develop our International Partnerships through Joint Programs and Visiting Scholars
 - c. Major Accomplishments for each Goal
 - i. We successfully conducted two tenure-track searches, one in Applied Mathematics and the other in Middle-level Mathematics Education. With both of these searches, we hired our first choice of candidates. We hired Dr. Mehdi Karimi for our Applied Mathematics position and we hired Julien Corven for our Middle-level Mathematics Education position.

- ii. We began a review of entry level courses we teach and we focused on MAT 113, Elements of Mathematical Reasoning and MAT 121, Applied Calculus. We have moved to an optional final exam for MAT 113 and we have revisited the nature of the questions on the final exam for MAT 121 as well as revisited the topics that should be emphasized or de-emphasized. We have a working group of instructors conducting a review of the Calculus sequence and we have committed a number of graduate assistants in the Spring of 2022 to support student learning in our calculus courses.
- iii. This sequence has now been approved at all levels and is ready to be implemented. Efforts were made at the College level and at the University level to address questions and suggestions about this interdisciplinary sequence.
- iv. While we were not able to launch the online Actuarial Masters Program in the Spring of 2022 as anticipated, we were able to work with CTLT and the Graduate School to address the issues they needed addressed before we could start this program. This was trickier than usual because it is online and has the potential for international student to enroll without being in the U.S., there continue to be issues with hiring faculty who would not physically be within the State of Illinois, and there were difficulties addressing the structural issue at ISU with charging differential tuition for this program. We believe we can now launch this program for the Fall of 2022 and we are starting our advertising campaign for this.
- v. Where we have been able to do this successfully in the past, with the COVID-19 pandemic, increased problems with the visa process, and the inability to hire faculty who would not physically be located within the State of Illinois, this has not worked out for us. Potential international visiting faculty have requested H1-B visas, which ISU has been unwilling to sponsor despite this being the practice at other institutions. This unwillingness to sponsor an H1-B caused a potential visiting faculty member for the Spring of 2022 to decline our position. ISU's stance on this has put at us at a significant disadvantage. We also recognize that ISU does not have a visiting faculty rank designation, which also hinders our efforts to recruit such faculty.
- vi. We continue to investigate international partnerships with universities overseas. Our most active partnership is our partnership with Tianhua College – Shanghai Normal University. We continue ties with Jiangsu Normal University and an informal program with the University of Ulm. We have also been approached about a potential partnership with Ningbo University of Finance and Economics, but this is only in its initial stages.

- d. Academic program development
 - i. Our new Data Science/Computational Mathematics sequences as part of our Bachelor's program was approved at all levels.
 - ii. After years of development, we are ready to launch our online Actuarial masters program.
 - iii. We are working to move our Masters program in K-8 Mathematics Education to an online program for the Fall of 2022.
 - iv. We have partnered with the College of Education and select community colleges within Illinois to develop courses that would articulate to our MAT 130. One of our partners,
- e. Equity, Diversity, and Inclusion
 - i. Underrepresented student enrollment in undergraduate mathematics programs increased from 21% In Fall of 2020 to 25% in Fall of 2021. This is the largest percentage of underrepresented student enrollment for the six years of date reported. While this is still below the University's percentage, as a STEM area we were pleased to see this progress in our percentages.
 - ii. We have resumed the Midwest High School Scholars Analytics Academy. The purpose of MHSSA week-long summer camp is to increase recruitment and retention of students from historically marginalized groups (e.g., students of color, Pell-eligible or low-income students, first-generation college students, etc.) interested in careers in actuarial science, analytics, and insurance.
 - iii. Within the context of our NSF-sponsored Research Experiences for Undergraduates, we help sponsor the annual Mathematics Research Academy that involve high school students from inner-city schools of Chicago.
 - iv. Jeff Barrett represented the Mathematics Department for the DEI University-wide symposium organized by Dr. Doris Houston.
 - v. A small contingent of Mathematics faculty participated in the College's EDI Mini-retreat.
 - vi. We had strong participation in the CAS Professional Development Series on February 18th featuring Dr. Ebony McGee, author of *Black, Brown, and Bruised: How Racialized STEM Education Stifles Innovation*.
 - vii. We continue Departmental discussions on awareness of this issue and steps we should take to address this value.
- f. Faculty Success
 - i. Professor Xing Wang received a \$167,923 National Science Foundation grant titled "Advanced mathematical theorems for Extreme Value and Risk Measure in Robust Intelligence."

- ii. Professor Maochao Xu received a \$15,000 grant from the Casualty Actuarial Society.
 - iii. Professor Barker continues to work on the \$133,290 National Science Foundation grant for the Research Experiences for Undergraduates program.
- g. Student Success
 - i. Beth Warden was named a 2021-2022 Bone Scholar.
 - ii. In the Fall of 2021, MAT had more honors students than any other program in CAS with 98 students having a first major in mathematics. That is about 1 in every 3 mathematics majors are honors students.
 - iii. Student retention from Fall 2020 to Fall 2021: 96% in Math programs stayed at ISU (compared with the University total of 83%) and 76% stayed in a mathematics major.
 - iv. We have started revisions of MAT 113 and MAT 121, examining the syllabi and structure of these courses to help identify potential barriers to success for these students. We anticipate continuing this process during FY23 with additional courses.
 - v. In August, we ran a one-day workshop for our graduate assistants to help prepare them for helping students in our introductory mathematics classes.
 - vi. For the Spring of 2022, we were able to fund graduate assistantships dedicated to helping students in targeted Calculus I & II classes (MAT 145 and MAT 146), working to assist with gaps in prerequisite material that we are witnessing as we transition back from remote learning contexts.

II. Internal Reallocations and Reorganizations in FY22

- a. Reallocations and Reorganizations
 - i. Upgraded our lead staff position to Business Administrative Associate and hired a new lead staff person.
 - ii. We hired a new ½ time office support associate to support faculty with duplication of materials and supplies.
- b. Additional Provost Office funds
 - i. We received over \$211,000 in base instructional capacity funds and general education funds which were used to fund faculty salaries to offer classes to meet instructional demand.
- c. College/Department funds
 - i. The Department was to receive \$10,000 in AEF Technology funds to install a tracking camera in STV 311 and we are working with Classroom Technology to have this installed.
 - ii. We have used our Foundation funds to support students with scholarships, support RSOs associated to the Mathematics Department

with funds for their meetings, membership fees, reimbursing students for actuarial exam fees, supporting the development of our online Actuarial Masters program, and honoraria for external speakers.

III. Major Objectives for FY23

a. Hiring more Tenure-Line Faculty to better support our Students

As mentioned in our narrative, we continue to experience faculty shortages in teaching the courses needed for our curriculum and to meet student demand. Each year we go through an agonizing effort to prioritize tenure-track line requests as there are many areas in the Department that are facing an acute need for faculty. The fact we have minimal tenure-line faculty in the courses included in the first two years of study in our major is problematic. Furthermore, we have the potential to grow and our new Data Science/Computational Mathematics sequence in our BS. Program has now been approved at all levels, so we can start offering this major to students. This proposal was accompanied with a commitment of support from the Provost's Office in the form of two faculty lines as documented by our Financial Implications Form. With the need to support expanding interest in Data Science at the University level as well, the now approved College of Engineering, and the University's EDI efforts, we have identified the following critical areas to hire in (in alphabetical order):

- i. Algebra/Discrete Mathematics
- ii. Biomathematics/Applied Mathematics
- iii. Mathematics Education with an expertise in designing, implementing, and evaluating culturally responsive teaching practices.
- iv. Statistics with an emphasis on Data Science
- v. Statistics with an emphasis on Actuarial Science/Predictive Analytics

b. Support Efforts for Student Success

We would like to support further efforts to increase student success in our programs and in our courses. This could involve further GA training and support as well as a re-examining of the teaching of our courses. This would also involve working to get more tenure-line faculty teaching introductory courses and supporting our majors earlier on in their educational experiences at ISU. We also continue to look for ways to enhance our learning spaces and the learning experiences of our students through use of updated technology and increasing our course offerings for students, which may necessitate the hiring of visiting faculty given the realities of tenure-line hiring.

c. Launch our Online Masters Programs in Actuarial Science and Mathematics Education

We have been working on the Online Actuarial Masters program for about six years now and this program is ready to launch for the Fall of 2022. We

will need to ramp up our recruitment efforts on this and continue to work with the Graduate School and the University to assure that the appropriate support is in place. This includes a previously agreed upon financial model with differential tuition and creating a new online sequence for our masters program that parallels our traditional face-to-face program.

In addition, we are implementing plans to move our Elementary and Middle School Mathematics Education sequence online in order to better meet the needs of practicing teachers. We believe there is more of a demand for our program based on enrollments in the online TCH masters program, and we would like to be able to provide this for these practicing teachers.

d. Increase enrollments in our program and pursue international partnerships.

This past year we saw declines in our enrollments in our programs (with the exception of our Ph.D. program). As we have seen this trend in other STEM disciplines, we conjecture that we might be experiencing some fall-out from the necessity to move learning experiences online during the COVID-19 pandemic. Anecdotally, we have heard from academic advisors that students seem less confident in their mathematical abilities as a result of remote learning and we have heard from instructors that some students describe their learning experiences in previous math classes as “Googling their way through MAT XXX.” We need to find ways to better meet the needs of these students, including exploring ways to incorporate more culturally responsive teaching practices, and encourage more students to pursue a mathematics related major.

One way for us to increase our enrollments is to take advantage of the opportunities for international partnerships that we are being asked to consider. There are many aspects of such partnerships to consider as we can use our current partnership with Tianhua College – Shanghai Normal University as a model for such partnerships. We will need to further explore the financial and legal aspects of such partnerships as well as making sure they are beneficial to the Mathematics Department and ISU.

e. Support our Faculty to foster Success in all aspects of their careers

Faculty, as well as students, have been affected by these past two years of COVID-19. Our goal is to support faculty in their teaching development and their scholarly development, as well as creating more opportunities for faculty to participate in service and shared governance. We need to support faculty in the teaching of their classes as we face students affected by their remote learning experiences during COVID-19, we need to give faculty support to find ways of incorporating more culturally responsive teaching practices. In addition, we need to support their scholarly efforts by providing support for grants, increasing opportunities to interact with other scholars which would include support for professional faculty travel, publication support, technology support, as well as

supporting opportunities to gather data and work with students.

IV. SBC Estimates

We approximate the following amounts to SBC:

\$43,000 in operating budget

\$15,000 in personnel budget

\$3,700 in IDC budget

We would like to use these funds to fund extra GA lines to support the faculty and students in our calculus classes and to supplement professional travel that we anticipate will resume at a more normal level as COVID-19 restrictions are lifted. We will use the IDC funds that are SBC'd to support grant development, honoraria for speakers, and other research activities as needed.