The School of Mathematical Sciences
Strategic Plan: 2018-2023
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Mission Statement

Innovate, educate, and extend the frontiers of knowledge.

Vision Statement

Human lives are enriched by education, discovery, and innovation, and our purpose is to contribute to those enterprises. The RIT School of Mathematical Sciences will be a center of research excellence, recognized for its contributions to mathematical and statistical science, and known for expertise in mathematical and computational modeling, data science, and scientific inference. The School will be recognized for its distinction in teaching and learning—equipping students with mathematical and statistical skills and tools, providing students at all levels with research and experiential learning opportunities, and nurturing curiosity and creativity.
Executive Summary

The School of Mathematical Sciences Strategic Plan has four main themes, which move the school towards the vision over the next five years.

**Academic Program Excellence and Student Success**

Through the engagement of faculty, student recruitment, and expanded curricular offerings, the SMS graduate and undergraduate programs will prepare students for careers in industry and academe. Toward providing excellent educational experiences and promoting the success of all students, the SMS will develop a culture of continuing improvement among the teaching faculty.

**Research Excellence**

The SMS will foster a research-active community with vibrant undergraduate and graduate research programs in which students work together in vertically integrated research groups. The school will be known for excellence in mathematical and statistical science and for its expertise in mathematical and computational modeling, data science, and scientific inference. Additionally, the SMS will develop the components needed to support center and programmatic grants.

**Faculty and Staff Recruitment, Retention, and Success**

Excellence in research and education will be supported by timely and strategic hiring and by developing an environment in which the dynamic and continual professional growth of members of the faculty and staff is encouraged, expected, and facilitated.

**Visibility, Outreach, and Community Engagement**

The SMS recognizes that it is positioned to play a positive role in the local community through sustained outreach that promotes awareness of the beauty and value of mathematics, fosters students’ confidence, and enables teachers. The SMS will promote and support signature outreach programs that benefit the community.

Specific goals, objectives, and action items that serve these goals are included in the strategic plan. The Head of the SMS is expected to facilitate the achievement of the items listed here through direction, support, and funding.
Academic Program Excellence and Student Success

The teaching mission of the School of Mathematical Sciences (SMS) includes both a commitment to the larger student body at RIT, and a responsibility to students who are matriculated in SMS programs at all levels. In the 2017-18 academic year the school had 322 undergraduate majors, 59 students in its masters-level programs, and 9 students (8 full-time and 1 part-time) enrolled in the Ph.D. program. Additionally, the school taught an aggregate total of 392 sections which contained 12,258 students, the majority of which were students in non-SMS majors. Effectively facilitating the intellectual growth and development of all of these students is central to the SMS mission, which shapes the following goals and objectives.

Prepare students for success in a wide variety of career paths

Student career preparation will be achieved by offering a rich selection of upper-division electives that incorporate mathematical rigor and 21st century skills and develop breadth and depth of knowledge. Through the curriculum and efforts of the faculty, the SMS will engender a culture of curiosity and active investigation, achieve educational goals in communication, and develop a robust problem-solving culture that is recognizable to specialists in other fields, to students and their families, to prospective employers, and to graduate school admissions officers.

Maintain a vibrant undergraduate research program

The experiential learning that takes place when students ask mathematical questions beyond those which have been cultivated for inclusion in course work nurtures their curiosity and creativity and aids in their intellectual and professional development. For this reason the SMS will undertake measures to facilitate undergraduate research and ensure that, as SMS grows its Ph.D. program in Mathematical Modeling, undergraduate students will benefit from the new research activities and resources that will be available.

Articulate and achieve educational goals

The educational mission of the SMS centers on the development of students as professionals who are capable of contributing to a technical society in meaningful ways. The academic programs of the SMS have educational goals in three areas, broadly characterized as knowledge, problem-solving ability and ways of thinking, and communication. The SMS will identify learning objectives for these goals, actively monitor the extent to which students achieve them, and react accordingly to assessment data.

Nurture a culture of continuing pedagogical improvement

This effort will include the support of forums in which faculty can share best practices, the encouragement of innovative teaching methods, and active engagement in the pedagogical development of new faculty and doctoral candidates.
Research Excellence

SMS faculty lead a highly successful program in Computational Relativity and Gravitation—including the Signature Interdisciplinary Research Area of Multi-Messenger Astrophysics—and established productive research groups in the areas of Biomedical Modeling, Dynamical Systems, Fluid Dynamics, Graph Theory and Network Analysis, and Inverse Problems. The SMS also has developing externally-funded research groups in the areas of Earth Systems Science and Data Science, both of which complement RIT and COS initiatives. Excellence in research will build primarily on these successful endeavors.

In addition, the SMS recognizes two opportunities to develop research initiatives that have the potential to raise the national profile of the School. In light of the COS initiative to grow the Center for Advancing STEM Teaching, Learning, and Evaluation (CASTLE), and considering that multiple education-related grants have recently been awarded to SMS faculty, there is an opportunity to develop a research program focused on collegiate-level mathematics education in SMS. Any hire made to support this area should be a mathematician or statistician who does education research rather than an education degree recipient. There is also an opportunity to develop a research center that supports students and faculty working directly with industry partners. Industrial mathematics leverages existing SMS industrial partnerships, closely aligns with the RIT focus on innovation, technology, and experiential learning, and would support the SMS requirements for experiential learning in the B.S. program and a co-op or internship in the Ph.D. program.

Achieve recognized excellence in targeted research areas

Building on current areas of strength, the SMS will develop an integrated research program focused on applied problems that is recognized internationally for impactful research in specific areas. This effort will involve maintaining support of research in areas currently recognized as excellent, devoting resources to accelerate the transition to excellence in areas that currently have potential to reach the next level, and building research expertise in new areas that complement other SMS, COS, and RIT initiatives. Additionally, receiving a programmatic grant (such NSF NRT) or center grant (such as NSF-Simons) would greatly enhance the reputation of RIT and SMS. Such grants, if awarded, would bring valuable resources to support SMS faculty and program initiatives. Therefore, the SMS will develop the components needed to make awarding such a grant an attractive investment to external funders.

Foster a culture that values and facilitates research

New research ideas often arise from unplanned interactions with colleagues and visitors (seminar speakers, short-term visitors, etc.). Therefore, purposefully promoting opportunities for faculty, postdocs, and students (both grad and undergrad) to interact in informal settings related to research will be encouraged. Beneficial outcomes include increased recognition of SMS research outside RIT, support for nascent collaborations, and submission of collaborative grant proposals.
Bolster excellence in graduate student research

With the establishment of the Ph.D. program in Mathematical Modeling, it is important to ensure that our graduate students become known for high-quality, pioneering research in areas of importance.

Increase connections with business, industry, government, and community

RIT has an extensive history of practical, career-oriented education. Emphasizing career skills and connections is an important selling point for prospective students, especially as the price of college is increasingly an issue and New York State schools have begun offering free tuition to some students. The growth in mathematics-related career opportunities is forecast to rise in areas related to computation and to applications of mathematics. The SMS will establish stronger research-related connections with business, industry, government, and the wider community to provide graduates of SMS programs with career opportunities that recognize and build on research experience and skills they have developed while at RIT.

Expand space and other resources for students, faculty, and research staff

The SMS will continue to advocate for space for research and for educational opportunities. The SMS will pursue the creation of the following spaces that will be central to the faculty in Gosnell to support interactions.

1. Common meeting areas for undergraduate and graduate students. This could be separate undergraduate and graduate spaces. All programs would benefit from meeting areas where students and faculty can meet (which is beneficial for a sense of community, support from other students in program, and getting to know more faculty and pair up for research, etc.)

2. In order to foster vertically integrated research groups, SMS should try to secure “lab” space for research groups. Such space would allow undergraduates and graduate students working on similar projects to collaborate as well as serving as a location for group meetings and journal clubs.

Faculty/Staff Recruitment, Retention, and Success

The School of Mathematical Sciences will continue to hire and provide professional development opportunities with the intention that faculty hired into tenure-track lines will be granted tenure in due course, that faculty hired into lecturer lines will be promoted to the rank of senior lecturer in due course, and that staff are continuously supported to allow for success and growth.

Ensure faculty success through strategic hiring processes

Ensuring faculty success starts at the hiring process by recruiting future faculty whose interests and talents align with this strategic plan. It also requires providing a welcoming and empowering
environment with high expectations and effective mentoring and administration. The SMS will conduct timely searches with the intention that each faculty member hired will be granted tenure.

Create an environment where dynamic and continual professional growth is encouraged, expected, and facilitated

Faculty/staff will continually strive for greater success with the collective goal of raising the SMS’s reputation within the university, the greater Rochester community, the nation, and the world. The SMS will provide faculty and staff with the mentoring, resources, and support needed for their professional growth.

Ensure efficient use of faculty resources

It is crucial for the department to use its faculty as efficiently as possible to maximize faculty time without sacrificing student learning. An assessment of SMS class policies—with consideration of innovative ways to achieve similar learning outcomes with more efficient resource allocation—will be conducted.

Encourage and reward service accomplishments

According to a survey of the SMS faculty, service is the part of the job where faculty feel they receive the least recognition from both colleagues and the SMS administration. Service assignments should be made thoughtfully with consideration of faculty/staff members' professional growth, and faculty/staff members will have annual goals to achieve and accountability for achieving these goals.

Visibility, Outreach, and Community Engagement

Develop signature outreach programs

The School of Mathematical Sciences recognizes that it is positioned to play a positive role in the local community through sustained outreach that promotes awareness of the beauty and value of mathematics, fosters students’ confidence, and enables teachers. Historically the SMS has had many good ideas for outreach programs, but has struggled to follow through and maintain these programs, year after year, as part of the school. Toward facilitating its larger educational mission, the SMS, as a school, will promote and support some number of signature outreach programs that benefit the community. The Head of SMS will be responsible for developing and maintaining these programs to ensure that they persist and thrive. Maintaining these programs, year after year, as part of what SMS does, is the essential thing for this strategic plan.

Increase online visibility

The website is one of the first things that prospective students, prospective faculty, and collaborators see of the SMS. It is also a potential resource for staying connected to SMS alumni.
Effort should be undertaken to maintain current, useful information about SMS programs and scholarship.

Appendix A: Organizational Structure Recommendation

SMS contains three separate undergraduate programs with around 80 tenure and non-tenure track faculty and four staff members. Creating an environment of excellence and professional growth requires leadership that is invested in the growth of each individual program and faculty/staff member. This is difficult in a school as large as the SMS but could be facilitated by establishing three new leadership positions to take stewardship of the academic programs and foster the development of their primary faculty: (1) the Associate Head of Applied Statistics, (2) the Associate Head of Applied and Computational Mathematics, and (3) the Associate Head of Student Affairs and General Education. This modified structure will increase the agility of the SMS and these positions will coordinate with the Head of SMS who will aid in these activities while focusing on the strategic vision, promoting the SMS both internally and externally, and growing the SMS into a national leader.