

Mathematics Department Response to the
External Program Review 2020-2021 Team Report
May 30th, 2021

The External Review Team spent two half days on February 11th and 12th visiting virtually with the Department of Mathematics. We appreciate the effort and time to complete a thorough review.

Program Review Recommendations for Change

1. *Create more opportunities for student research*, such as Research Experiences for Undergraduates (REU), undergraduate research opportunities, and internship opportunities with local businesses and industries. (Standard C – Student Learning Outcomes and Assessment)

The review team noted that undergraduate research is *an important element of the Mathematics Department*. Mathematics faculty are using innovative teaching to promote high-impact practices and involve students in undergraduates' projects. Undergraduate research is also identified as a departmental challenge and it is one of the review team's recommendations to create more opportunities for student research. The Mathematics Department provides several opportunities for students. We have Mathematics Mondays where students work on solving problems from mathematical journals, College Mathematics Journal, or Mathematical Magazine. Students also have the opportunity to give presentations at Math Factor (mathematical club) or at Undergraduate Symposiums. Our students regularly participate in different mathematical contests. For example, our students participated in Math Jeopardy or Integration Bee at the regional MAA meetings (Mathematical Association of America). A team of math students under the supervision of Dr. Afshin Ghoreishi received an honorable mention in Mathematical Contest in Modeling. The contest is an international contest that challenges teams from approximately 900 international institutions to analyze open-ended problems. The department plans to continue providing these opportunities, and we plan to do more. For example, we can provide more information about REU programs (Research Experiences for Undergraduates) as recommended by the reviewers.

2. *Hire more faculty*. Two more faculty members are needed for statistics (to support current course offerings and the growing demand in the new Data Science degree), one more faculty member is needed for applied math (especially to support the growth in Engineering and to address increased summer demand), and one more faculty member is needed for mathematics education (to support growth in the near future). We note that the growth of the student body is outpacing the growth of the Department's faculty to support it. (Standard E – Faculty)

The external review report noticed that the department has a pleasant working atmosphere and in general, faculty get along very well. Mathematics faculty are also supported in their research and professional development through funds available from the department, college (the dean's office), and the university (RSPG grants). However, a significant shortage of math faculty creates overwhelming challenges. Faculty feel overworked and *feel indirect pressure to volunteer for extra projects*. Several faculty members work on many different projects that they do not have time to get involved in new initiatives, even for extra pay.

The review team identified the need for two Statisticians and/or Data Scientists and Applied Math faculty to support the growing demand for statistics courses and the new engineering programs. Mathematics Department completely agrees with the review team. We are in desperate need of Statisticians and/or Data Scientists to provide quality instructions, satisfy the needs of today's world regarding data science, and grow Computational Statistics and Data Science Program. Our faculty noticed that there is also a growing need across the University for a Statistics Center, where faculty and students could get help with data analysis and statistical inferences. It is also noticed in the program review report, that new programs, such as Mechanical Engineering and Electrical Engineering were not accompanied by adequate faculty resources. Mathematics plays a significant role in cultivating quality engineers. The math department struggles to satisfy the demand for a growing number of math courses required by the engineering programs, such as Calculus I, Calculus II, Calculus III, Linear Algebra, Differential Equations, and Probability and Statistics.

The review report also mentioned a need for a Math Education faculty. The department recently hired a Math Education faculty, Alees Lee, so the need for Math Education is currently not a priority for the department. However, if we grow our programs and if the demand for offering more math education courses grows, we might need an additional faculty line in Math Education.

3. *Hire a dedicated advisor* for the Department. With increasing numbers of students, more advisors are needed. This would allow Matt Ondrus to spend more time engaging in teaching and research activities. (Standard D – Academic Advising)

The department has many challenges to overcome, for example, we see more students with weak algebra skills, and more students come less prepared to take college-level math. The department also struggles with lack of resources. In addition to faculty shortage, the lack of a QL Advisor puts a huge burden on the administrative assistant, on the chair, and several faculty. Navigating QL courses is not an easy task due to the variety of QL courses, varying requirements of other departments, nuances that impact individual students, varying pathways (prerequisites), and details surrounding testing and placement. University advisors are not well equipped with current information about QL courses which results in frequent mistakes and students receive incorrect information about issues related to needed QL courses, placement, prerequisites, and other aspects. Moreover, there are frequent changes in curriculum in the Mathematics Department or in the Developmental Mathematics Program. It is a large job to

communicate both existing policies and impending changes to all the needed parties across campus, and the department currently does not have capacity to engage in this.

4. *Create more support for online teachers to teach remotely with effectiveness. Expand the university's professional development offerings with College and Department training sessions for effective remote delivery of course content. (Standard F – Program Support)*

This recommendation might be related to the pandemic time where math faculty felt overwhelmed transferring math courses to the online environment. At the beginning of the pandemic, the Math Department provided several training sessions for adjuncts and faculty. The university also offers extensive training workshops for faculty. For example, there are several different short courses/workshops on Training Trackers, also Teaching and Learning Forum provides several sessions where faculty can share their best practices of online teaching. As we now transition to face-to-face teaching the interest in online teaching is very low. In the fall, we plan to discuss the faculty needs in regards to online teaching, and if needed the department will provide training for effective remote delivery.

5. *Administrative support for the department should be increased. Currently there is just one support staff member who is extremely competent, engaged, and energetic, but also overworked. (Standard F – Program Support)*

The department agrees with the recommendation of having more staff working in the department. The Mathematics Department serves a large number of students every semester and the Administrative Assistant often feels overwhelmed with the work. The amount of work required from the Administrative Assistant in the Math Department is significantly above what is required in other departments because the department provides courses for our majors, support courses for many different departments, and QL courses for all students at the university. Perhaps hiring a QL advisor could help reduce the amount of work because the Administrative Assistant spends an enormous amount of time answering questions surrounding QL, and this allotment of time is typically in conflict with the need to address other departmental priorities.

6. *Resources should be provided to hire more faculty members to support the increasing student enrollments in engineering and in statistics. As has been noted, there is a need for an increase in budget to hire faculty to support the increase in engineering students' math courses. Administrators identified the need to implement more high-impact practices in the department as well as the need to improve the 67% pass rate in Pre-Calc. (Standard H – Results of Previous Program Reviews)*

The shortage of math faculty was addressed in the third recommendation (see above). We have also submitted a detailed justification for new faculty lines in 2020 SPR. The department hopes

that the university would be able to provide much needed additional faculty lines in mathematics and statistics.

The department has been trying to implement high-impact practices in several courses, and we plan to continue working on improving high-impact practices. For lower-level courses with very high enrollment it's difficult to implement high-impact practices on a regular basis. Lowering enrollment from 35-40 to 20-25 would make it possible for faculty to give more personal attention and to implement several high-impact practices. However, the department currently does not have the resources to lower class sizes. Even with the high enrollment of 35-40 students in QL courses all instructors implement at least one high-impact practice, such as a Signature Assignment. The math faculty discusses and shares different forms of Signature Assignments that work well for different QL courses.

We plan to address the lower pass rate (67%) in PreCalculus classes. PreCalculus is a fast-paced course that combines two courses into one semester: College Algebra and Trigonometry. Several of our students cannot keep up with the fast pace of the course and we often see a large number of Ws in this course. The department will carefully examine the problem - collect more data on the passing rates to determine what the problem is and we will try to create a solution to improve the pass rates for this course.

Additional Recommendations and Comments

1. With the current trend of growth in student numbers, perhaps creating an interdisciplinary Master's degree would be beneficial. We recommend that the Colleges of Science, EAST and Business explore this potential future degree offering. (Standard A – Mission)

The Mathematics Department agrees with the recommendation of exploring the possibility of creating an interdisciplinary Master's degree with EAST and Goddard School of Business & Economics. The interdisciplinary degree might serve our students and the community well. The department has been discussing this possibility since last Spring, and we plan to continue working on this important degree during the upcoming academic year.

2. The Department of Mathematics has an expectation of one publication per year for tenure/promotion. Perhaps this is too high a level of scholarly activity, given the high service and teaching demands placed upon the faculty. It may be appropriate to reduce the teaching load of individual faculty who are particularly active in research and other scholarly work. (Standard E – Faculty)

The Mathematics Department does not have an expectation of one publication per year for tenure/and promotion. The department follows the University and the College of Science

tenure and promotion documents. Math faculty are encouraged to stay active in research and engage in scholarly work.

The idea of reducing the teaching load of faculty who are particularly active in research and scholarly work is a good idea, which should be communicated and addressed at the university level. The Math department, like other departments, is required to follow the university policy, PPM 4-6 regarding faculty load, and at this time does not have the authority to reduce the load for those faculty.

3. Administrative Assistant Debi Larson has recently completed a new professional certification. She is therefore even more valuable to the Department. We recommend that she be given a raise. (Standard F – Program Support)

The department completely agrees that Administrative Assistant, Debi Larson, is very competent and valuable to the department and certainly deserves a raise.

However, raising salaries is not in the department's jurisdiction.

Moreover, as this report was revised on May 30th, Debi Larson resigned from the Math Department and was moved to another position in the College of Science. So this recommendation is no longer relevant to the Mathematics Department.

4. Concurrent Enrollment is burdensome to the faculty. (Standard B – Curriculum)

The Concurrent Enrollment program is also a burden for the department. Currently, we are serving four school districts: Davis, Morgan, Ogden, and Weber. We also work with four charter schools and one private school. The enrollment in concurrent enrollment is continually growing. The number of schools offering math classes and the number of teachers teaching concurrent enrollment classes are also increasing. In the 2019-2020 academic year, we had more than 3000 students enrolled in Math 1030 CE Contemporary Math, Math 1050 CE College Algebra, and Math 1010 CE Intermediate Algebra. We have also supported about 50 CE teachers teaching concurrent enrollment math. The Mathematics Department is continually struggling to support those courses because of a lack of adequate resources. Currently, six math faculty are working with the concurrent enrollment program in addition to the CE program coordinator. The CE program had been funded by the Utah State Grant for the upcoming year 2021/2022 as the last year of funding. The continuation of the program is uncertain if the university does not provide adequate funding for subsequent years.