

Report of the External Visiting Committee to the Department of Mathematics Weber State University

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Summary

In addition to providing the mathematical training of all future STEM graduates, the Department of Mathematics provides the specialized training of roughly 150 mathematics majors. These include future K-12 teachers of mathematics, as well as students intending to pursue advanced degrees in the mathematical sciences. In order to carry out these functions, for example to offer research experiences for its majors, the Department maintains an active research environment. As part of its teacher training activities, the Department also works extensively with in-service K-12 teachers. These are critical functions at the core of the mission of Weber State University, and are absolutely essential for future success of the University.

The Department of Mathematics is exceeding expectations in each of these functions. But the situation is very clearly not sustainable. Despite substantial enrollment increases over the past decade, the size of the regular faculty has shrunk considerably. Fourteen regular faculty members (supported by a single administrative assistant) are responsible for over 6500 annual enrollments. These fourteen faculty members teach extensively, provide personalized advising to all math majors, provide research opportunities to majors, oversee pre-service teacher training activities, reach into local school districts to provide professional development for in-service teachers, engage in outreach activities for middle and high-school students interested in pursuing STEM careers, in addition to maintaining active research careers.

In order to sustain these functions, the Department requires additional regular faculty. They also require additional advising support. Release time should be made available to faculty members applying for external funding, particularly capacity building grants, to address the critical functions of the Department.

Without additional resources, the Department will be forced to employ more adjunct faculty, increase class size, and scale back the attention it can provide the students it serves across the board. Student success rates will be compromised. If the central administration does not respond to the needs of the Department of Mathematics, the training and retention of all STEM majors on campus will suffer considerably, as will the training of future K-12 teachers of mathematics.

Departmental Strengths

The faculty of the Department of Mathematics is highly engaged in the teaching of the students they serve. They provide an outstanding education for their majors, including extensive undergraduate research opportunities, and a high quality experience for non-majors in their service courses. All of the students we interviewed uniformly praised the quality of faculty instruction they received in their courses. The expertise and dedication of the faculty is one of the Department's greatest strengths.

The committee also noted that many of the current majors we interviewed began their studies in relatively low-level courses, like Math 1050 (College Algebra). The Department should be commended for nurturing these students through to completion of their major requirements.

The Department has strong connections with the K-12 educational community, both at the local and State levels. Because the Department trains many future teachers of mathematics, these connections are extremely valuable.

The Department pays considerable attention to their services courses, particularly courses like Math 1050 (College Algebra) and Math 1210 (Calculus I) which are heavily subscribed by STEM majors. The success rates in Math 1050 are impressive: roughly 75% of students receive grades of C or higher. This compares very favorably to other higher educational institutions in the state. On the other hand, these success rates are demonstratively not the product of grade inflation, as these students progress successfully to courses like Math 1210.

The administrative support in the Department is excellent (but overburdened).

Areas of Concern

The faculty have demonstrated expertise and commitment in teaching and research. But they are so overwhelmed by the surge in enrollments that they are forced to make difficult decisions about how best to invest their limited resources. A particular area of concern is that the short-handed faculty can only offer some of the core courses for majors once a year (or, in some cases, once every other year). Several majors we interviewed indicated that their time to graduation was extended by a year because of limited advanced offerings. Specific recommendations for capacity building are given below.

Another area of concern is the advising students receive. Until recently, Chair Talaga has been the sole departmental advisor for majors. He has recently launched a system that spreads major advising among all faculty members. This is clearly a step in the right direction (once again at the expense of the limited resources of the faculty), but we believe more can be done.

A persistent problem in departments (not just math departments) which employ large numbers of adjunct faculty is maintaining the uniformity of standards across all departmental offerings. Chair Talaga has done an admirable job reviewing the performance of adjunct faculty as well as the exams that they give, but it may be helpful to implement a more structured system to ensure that the Department's standards are being met in all the courses it teaches. Specific recommendations are given below.

Recommendations

The most pressing challenge facing the Department is the need for extra faculty resources. More faculty are needed to offer required courses more routinely and to lessen the dependence on adjunct faculty. We urge the central administration to take this seriously.

We also encourage the Department to pursue external funding opportunities, like the NSF's Noyce Grants, in order to build capacity. Writing such a large grant, particularly for the first time, is a serious, time consuming activity, but the payoff is potentially very substantial. The College of Science should therefore consider making a small investment (in the form of faculty release time) to catalyze this process. The College should also consider bringing in consultants (for example, PIs on existing Noyce grants in Utah) to guide the Department's grant-writing activities.

Personalized advising is a low-cost, high-impact strategy for both recruitment and retention of majors. Clearly, faculty need to be involved for advanced students. But since many advising questions, particularly for students just beginning their major studies, are relatively standard, they need not require the attention of faculty. These questions could be fielded by a successful advanced undergraduate major who could then refer more detailed questions to faculty members. Hiring such a student would be very inexpensive (especially if the student were work-study eligible). It may also make sense to consider hiring work-study students for other day-to-day administrative tasks in the Department. We urge the College to make funds available for these purposes.

The Department's success rates in gateway courses (like Math 1050 and Math 1210) are already high. But faculty should be encouraged, possibly by being offered teaching release time, to pursue alternative approaches to these courses to further build on their strong success rates. Alternative approaches should be studied for effectiveness and then modified, discarded, or expanded as appropriate.

The Department should consider implementing uniform final exams and possibly uniform midterm exams in courses up to and including Calculus I. Implementing uniform examinations is a relatively simple (but high-impact) strategy with multiple benefits. Uniform examinations with common grading help ensure uniform standards (which are especially important because of the large number of adjunct teachers). Uniform examinations promote cooperation among the faculty and would provide savings in time and effort that could help provide more resources to address the needs of students. Instructors in courses with common exams are perceived more as a coach and mentor instead of a gatekeeper. The Department should consider using multiple-choice questions for some portion of examinations as many mathematical tasks can be appropriately assessed using them. This will likely require instituting course coordinator positions (who would oversee the final exam writing, for example, and visit the classrooms of adjunct faculty). Course coordinators could be compensated with release time.

The Department should also consider instituting appropriate procedures for the orientation of new contract/adjunct faculty.

Finally, the Department would benefit from the development of a better strategic plan with clear priorities. This has been somewhat lacking (again largely because other pressing demands on the faculty have left no time for it).