

**Academic Program Review
Mathematics Department
University of Colorado at Colorado Springs
Report of the External Team
March 2006**

This report of the external team is based on the self-study and supporting material submitted by the Mathematics Department, and on extensive discussions during a two-day visit to the UCCS campus (March 9–10). The report highlights both the many strengths of the department, as well as significant and numerous challenges that it faces in the near future. It should be said at the outset that the external team is aware of the critical budget situation in recent years in the state of Colorado, within the CU system, and on the UCCS campus. For this reason, we have done our best to identify problems and solutions that do not rely on increased levels of funding. However, the fact remains that many of the challenges facing the department require either the restoration of lost resources or the allocation of additional funds.

This program review comes, perhaps fortuitously, at a critical moment in the life of the Mathematics Department. In four months, the department will move from the College of Engineering and Applied Science, where it has resided for 30 years, to the College of Letters, Arts and Sciences (LAS). It is a time of uncertainty and opportunity for the department, as was made clear in every conversation we had with administrators and faculty members. It is our hope that the timing of this report and the program review will allow the Mathematics Department to move into LAS under the most favorable conditions possible and with a strong sense of opportunity.

Strengths

On the whole we found the Mathematics Department to be a remarkably cohesive and productive department. Faculty members claimed it is a “unique department for collegiality” and a “ridiculously collegial” department; and indeed we saw evidence of that spirit.

The research productivity of the department is impressive. Three faculty members hold federal research grants, there is a history of funding for educational and outreach initiatives, and there are several proposals in submission phase for additional support. Publication rates are good, particularly in light of the 3-2 teaching load. There seems to be some truth in the claim of one faculty member that it is the “best research faculty in the country for a Master’s-level institution.”

The department is highly committed to its teaching mission. The faculty is energetic and innovative in its teaching, and it maintains informal contact with students through advising and department events. Mathematics faculty members pioneered (at least locally) distance learning through its Math Online program and it has introduced technology in the classroom in creative ways. Outcomes assessment seems to be taken seriously by the department. It has developed several assessment instruments in both major and service courses, it has initiated a placement/retention program in lower division courses, and it supports the highly effective Mathematics Learning Center.

The students we met (admittedly a small sample, all from the Math Club) were effusive in their praise of the faculty, its enthusiasm and accessibility. Indeed the healthy rapport that we found within the faculty seems to be shared by the students.

The mathematics faculty appears to have a salutary presence on the campus in terms of governance and service. Particularly the senior faculty members have a long history at the institution and are involved in many college and campus committees. The faculty also has a presence in the community, particularly in outreach efforts with the K-12 schools.

Overall, the external team sees a department that has exceeded expectations and accomplished much. Success has been achieved largely because of the faculty's remarkable dedication to the department, its devotion to the profession, and its seemingly selfless *esprit de corps*. At the same time, it has succeeded in the face of critical shortages of resources, relatively heavy work loads, and below-peer-average salaries. Our concern is whether or not this department can remain coherent and productive indefinitely under these conditions. The answer depends in part on whether the challenges that follow are addressed.

Challenges

The challenges discussed below are diverse and for the most part are non-prioritized. The self-study identifies three areas of improvement; we begin with two of them.

1. Enrollments and graduation rates. Total student credits hours taught by the Mathematics Department at all levels have been virtually flat for the last three academic years. During that same period the numbers of Bachelor's and Master's degrees have also been flat, while student credit hours attributed to undergraduate majors have increased by about 15% over the same period. We conclude that the department is fulfilling its service role and is doing a good job of keeping its own mathematics pipeline full.

Recommendation: We recommend that the department remain enterprising and persistent in its recruiting efforts. At the undergraduate level, specific areas of emphasis, such as actuarial science, applied statistics and mathematics education, that meet the needs of the surrounding community, should be promoted. Interaction with local two-year colleges should be strengthened as a recruiting tool. The department seems well aware of the needs of the surrounding research/military sectors. The department should continue to strengthen ties with these sectors for the purpose of recruiting students.

2. Part-time instruction and new faculty positions. The department relies as heavily on honorarium instructors as it did at the time of the last academic program review. The efforts of the department to change this situation have had little impact. The external team urges caution in hiring non-tenure-track (NTT) full-time (FT) instructors to address this problem. Given the current teaching load of the regular faculty and the relatively high salaries of NTT-FT instructors, there seems to be little gain in hiring the latter. The dependence on part-time instructors is best reduced by hiring new high-quality faculty members, who can contribute to the teaching mission of the department and increase its research productivity.

Perhaps the greatest concern we heard from faculty members about the future and the move to LAS is the loss of two faculty lines due to retirements. The loss of these two positions in a department arguably already stretched is critical. If this loss is permanent or

if replacements are delayed, morale, work loads, and overall productivity of the faculty will be adversely impacted. (For example, a key capstone course in the undergraduate program was recently dropped for lack of available faculty members. Additional undergraduate course offerings, mentioned by students as an area of improvement, are unlikely for the same reason.)

The concern is well-founded, because once in LAS, the Mathematics Department will be one of about 16 departments, all competing for resources and faculty lines. Without knowing the needs of other LAS departments, we nevertheless believe that these two faculty positions should be given the highest priority. If filled in the near future, these positions will restore the faculty ranks to their current levels, they will address the long-term goal of reducing honorarium percentages, and they will maintain the productivity of the department.

Recommendation: We recommend that upon entry into LAS, the Mathematics Department be given a clear hiring schedule with a commitment to hire new faculty members on a specific timeline. As a part of this negotiation, we suggest developing a strategy to gradually reduce the percentage of honorarium instructors.

3. Articulation of expectations. In various ways, we heard from faculty members in all ranks that expectations of individuals and the department need to be articulated clearly. As one senior faculty member said, “it would be nice to have a clearer picture of the reward system.” There seems to be a sense that faculty members are expected to do everything and do it well. But there are limitations. For example, a 3-2 teaching load is *not* standard in a department with moderate to high research and funding expectations. The so-called “profit-loss” funding model, of which the faculty seems to have some awareness (discussed below), also sends mixed messages: should the department cultivate its own majors and graduate students or focus on service teaching?

Recommendation: The move to LAS is an opportune time for the faculty to meet with its new college administration and have a clarifying discussion about department and faculty expectations.

4. Ph.D. program. Of great concern to the faculty is access to the Engineering Ph.D. program. There is an understandable desire on the part of several faculty members to have continued access to a doctoral program. However, at the moment, there is uncertainty about whether mathematics graduate students can continue to apply to the program once the department is in LAS. We ask whether it is in the interest of the department to produce Ph.D.s in Engineering or whether the program is even an effective recruiting tool for mathematics graduate students.

Recommendation: The uncertainty about the Engineering Ph.D. program should be resolved by the deans and Office of Academic Affairs quickly. Even if the decision is unfavorable to the Mathematics Department, the faculty can at least move ahead and make plans for alternatives. Provisions should be made to insure that the three or four students currently in the program can complete their degrees.

5. Recruiting and support of graduate students. Growth in the Master’s program will occur only with increased levels of support. Recruiting and retention of qualified graduate students requires competitive teaching assistantship salaries, full tuition waivers

(or stipends), and lighter teaching loads. As with other challenges discussed, support of graduate students by the institution is a matter of priorities and expectations (the articulation of which we recommended above). If the growth of graduate programs is a priority, then additional institutional support of graduate students in the form of competitive teaching assistantships is needed.

Recommendation: With the move to LAS, we recommend a re-evaluation of how graduate programs in mathematics fit into the larger college picture. Will they be expected to grow and thrive, or merely exist? In either case, the mathematics faculty must continue to be resourceful in finding external sources of funding for graduate students. These sources might include research assistantships from external grants, fellowships and internships sponsored by local industries, or special fellowships for students in the military.

6. Faculty work load. There are several related issues here. Some faculty members told us that their research programs are compromised by their teaching loads (and in fairness others claimed that their teaching load was manageable). But it was evident that for some (particularly junior) faculty members, meeting research expectations is difficult. These discussions raised some questions that should be resolved. For example, we heard mixed beliefs about whether and when course reductions with grants (both external and internal) are possible. In some cases, course reductions are allowed and in others they are not. The mathematics faculty includes some talented mathematicians who were hired for their research potential. Given the opportunity, they could develop outstanding research programs. However, retention of these faculty members may depend on providing these opportunities at UCCS.

Recommendation: Again the move to LAS is an auspicious time to clarify expectations and policies. Teaching loads vary across LAS; so the teaching load for the Mathematics Department should be negotiated and made clear at the outset. Reduced first-year teaching loads for new faculty members should be offered. The policy in LAS on course reductions with grants should be enunciated clearly to the mathematics faculty.

7. MLC director. The loss of the director of the Mathematics Learning Center is untimely and critical. According to all, this is a pivotal and strenuous position that was held by an energetic well-qualified person. It was described as a “two-person job” as it requires full-time teaching in addition to the MLC responsibilities. The MLC has experienced “growth in the face of declining resources” and is a key resource in many campus initiatives (such as student retention).

Recommendation: The MLC position must be filled quickly by a permanent and highly-qualified person, but not before the expectations of the job are clearly spelled out and the salary is reconciled with those expectations.

8. Communication with other departments/colleges. We saw no evidence that the Mathematics Department is failing to communicate with other departments and colleges about service teaching. But its efforts must be redoubled. For example, there is a need for a two-semester calculus sequence for chemistry and biology majors that should be explored. We had difficulty understanding the relationship between the Mathematics Department and the College of Education, but it seems evident that closer communication and interaction could be beneficial. For example, a joint appointment for a secondary

mathematics specialist might be a possibility. A large percentage of mathematics instruction is devoted to pre-service and in-service teachers; these courses should be examined periodically in concert with the College of Education.

The teaching of statistics is a precarious subject on every campus. But in a time of strained resources campus-wide, it may be possible, under the guidance of deans or Academic Affairs, to propose combining multiple statistics courses for the sake of efficiency. The Mathematics Department might play a role in these discussions.

Recommendation: As in the past, the Mathematics Department must continue to play a role as an effective and responsive service department.

14. Honorarium salaries. One member of our team observed that half of the student credit hours in the Mathematics Department (and probably the campus) are generated by “volunteer labor.” We feel compelled to ask for a review of honorarium salaries at UCCS. The current rate of \$2000 for a three-credit course, without benefits, possibly with large class sizes, is significantly lower than institutions we know.

15. Institutional issues. We close with three observations that go beyond the scope of our team, but seem worth including.

a. There is a need for an automatic system to check prerequisites when students register for courses. Until a student data system with this capability is installed, an improved manual system should be invented.

b. We do not claim to understand the details of the so-called “profit-loss” model for funding departments and colleges. Our aim is not to argue for or against the model. However, if and when the model is implemented, its non-budgetary consequences should be anticipated. We spoke to faculty members who knew about the model, but had an incomplete understanding of it. They claimed that it would be manipulated by colleges to their advantage; that the Mathematics Department would be penalized because it is a service department with few majors and that it would suffer because its majors often declare late in their college career. A little understanding can be a dangerous thing. We recommend transparency about this budget model so that everyone knows the rules and plays by the same rules.

c. There is a need for a campus-wide curriculum oversight committee coordinated by the Office of Academic Affairs. We heard allegations of colleges “raiding” mathematics courses, or planning to do so, and using the “profit-loss” model to unfair advantage. Such a committee could mediate in these claims and oversee academic issues that involve two or more colleges.

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