

## **Mathematics BA, BS, MS, MAT, and Ph.D.** **Program Review: Provost**

### **Comments:**

The Program Review notebooks were thorough and well-organized, which is much appreciated. However, different from most of the other Program Review notebooks provided, the material in the primary notebook followed the Provost's instructions for the self-evaluation, giving this a much more detailed treatment than the other departments and focusing almost exclusively on the instructional role of the department, rather than its contributions in research or service (except for service courses). The Accreditation notebook was not quite up-to-date (2004), but contained information on faculty research and service.

To get a more up-to-date view of faculty research (especially for new faculty), we also looked at the DMS website. From review of the c.v.'s posted on the department website most of the junior tenure-track faculty have quite substantial recent publication records. Most of the senior faculty do not post their c.v.'s on the web, but the 2004 notebook listed 02-03 publications by Avdonin, Rybkin, Buehler, Faudree, and Thomas, among the current DMS faculty.

The total of BA and BS Mathematics program enrollment has increased somewhat (5-10%) during the review period. The degree yield ratio (average headcount/average annual degrees) for the BS is about 0.2, above the median for CNSM and CLA baccalaureate programs (see attachment); the value for the BA is slightly below the median, but the BA program has few students. For a program whose enrollment, retention, and degree award rates are constant, the degree yield ratio is equal to (fraction of students retained to degree)/(average time to degree), so a larger value suggests that retention is higher or time-to-degree is shorter relative to other UAF programs. The value of the BS program degree yield ratio is consistent with a retention rate of 70% and an average time to degree of 4 years (or >80% retention and 5 year time-to-degree). By this measure the productivity of Math baccalaureate programs is good.

The MS in Mathematics has a small enrollment, averaging about 7 students over the review period. The degree yield ratio (see definitions above) is about 0.22, near the median for CNSM and CLA Master's programs and consistent with good retention and reasonably short average time-to-degree, e.g., 70% and 3 years, respectively.

Neither the MAT nor the Ph.D. have graduated any students during the review period. The MAT has recently (in 2006) enrolled 2 students; the Ph.D. had 6 students at the end of the review period, but now two of those students have switched to Master's programs, and all of the Ph.D. students are advised by only one faculty member. As Dean Braddock notes, the MAT costs nothing above the cost of the MS program, but may not be worth retaining (at least in its current form) if it does not attract students. The Ph.D. program, likewise, does not have program specific costs, since graduate course offerings mainly serve the needs of the Master's students and some students in other fields employing

advanced mathematics, like Physics. However, the inverse of this argument is troubling, in that it suggests that UAF offers little to Ph.D. students, in terms of courses, above the Master's level unless it is in terms of quantity of courses taken. Of course, research opportunities are equally or more important at the Ph.D. level. A positive indicator is that a substantial number of students received RAs over the review period, 6 during the academic year and 5 in summer terms. (It's not clear if the latter group is distinct from the 6 funded during the academic year). An included survey of faculty indicated that most felt their personal research programs could not support a Ph.D. student, although most faculty wanted to continue offering the Ph.D.

Although we have reservations about the quality of a Ph.D. program with a single faculty member who serves as a thesis advisor and a history of problems with enrolling a critical mass of students, we support the dean's approach to continuing the Ph.D. program for the next review period; but it will be subject to a serious re-evaluation in 2010. Several questions that must be addressed at that time are (1) Has a broader group of faculty, especially including some of the recent hires, begun advising Ph.D. students? (2) Has an enrollment of about 5-10 students been sustained? (3) Have a reasonable fraction of the students admitted before 2007 completed their degrees? (4) Have these students had successful outcomes, e.g., employment in their field, publication in peer-reviewed journals, etc.? Negative answers to most of these questions will probably result in termination of the program, or at least, suspension of admissions until a more favorable climate exists.

The cost/SCH for this department is in the lower part of the range for CNSM. In part, this reflects the use of Instructors and adjuncts to teach some lower division service courses, which is an appropriate use of limited resources. Math expresses some concerns about the variety of individuals teaching 100 level Math courses (including the adjuncts, faculty in CDE and at TVC and rural campuses) and the difficulty in maintaining uniform standards. This indeed deserves continuing attention, not only from math with respect to their own adjuncts and Instructors, but from other UAF units.

Student learning outcomes assessment presented in the Program Review notebook is progressing well, although data were first examined by the faculty in 03-04 and the assessment plan was revised at that time. The outcomes in general are very positive. Particularly impressive are the high percentile scores for seniors on the ETS Major Field Test in Mathematics, usually well above the 80<sup>th</sup> % tile, and once (in 02-03), at the 99<sup>th</sup> % tile. UAF students have also done well in national and international mathematics competitions. An exit survey indicates that most graduates are quite satisfied with their education. Although there were few indications that curricular changes are needed at this time, there was a revision to the 'W' courses to assist students in meeting that requirement, and the review notes that the importance of meeting prerequisites will be strongly emphasized in advising, since lacking prerequisites often leads to poor performance. Math has also regularly contributed to the assessment of the Mathematics part of the Core curriculum. Here the most serious problem is that successful completion rates for Math core courses are very low, on the order of 50%. Mandatory placement and increasing Math 107X credits from 3 to 4 are being implemented in an effort to improve

this statistic. A particular challenge for Math is assessing outcomes 'whenever and wherever' courses are offered, particularly with reference to Core courses that are offered by CDE, TVC, and rural campuses. Substantial efforts have been made to collect assessment materials from these units but with limited success. This needs improvement, and the Vice Provost will continue to encourage CRCD to provide more coordination and support of this effort. Assessment of the MS is mainly based upon the written comprehensive examination, an exit survey, and employment/education success of alumni. Pass rates on the comprehensives have been high, and exit/alumni surveys indicate that the students are satisfied with their program and are successful in finding related employment or continuing in Ph.D. programs. Assessment of the Ph.D. program is not possible since there have been no graduates since 1996, but Ph.D. students are being evaluated based on the Master's comprehensive (which serves as a qualifying exam), an oral exam in the area of the dissertation, and exit/alumni surveys similar to those for the MS. Mathematics has made good progress with outcomes assessment. It's very important that collection of assessment information and regular faculty review of that information continue for the next five years, leading up to the re-accreditation self study in 2010.

As most degree programs at UAF have done in the course of Program Review, Math indicates that they have not had enough faculty to teach all of their catalog courses. Dean Braddock's review indicates that in FY 2007 there are 13 FTE faculty in Mathematics and Statistics, up from 10.5 on average during the review period. While perhaps not optimal this is a considerable improvement. We also note that the UA FY08 budget request includes Math faculty positions and additional TA's.

Also in common with other departments, DMS expressed frustration with classroom facilities (even insufficient chalk/whiteboards) and with lack of projectors and adequate internet conductivity in many of the classrooms. These matters are receiving attention at the campus level and substantial improvements should be seen over the next several years.

Space continues to be an issue for Mathematics and Computer Science, and unfortunately (except for adjustments that may be achieved by removing stored items or remodeling) there is little opportunity for improvement in the short term. Marked growth in several CLA programs (and the new Psychology Ph.D.) and Engineering have led to very tight space situations on lower campus, and most administrative units that can move off campus were moved in Summer 2006. If BIOS is funded, backfill may improve the situation in about five years.

**Recommendation:** Continue with change.

1. Continue to implement Student Learning Outcomes Assessment.
2. Continue departmental evaluation of the Ph.D. program, including minimum criteria for (a) number of Math faculty serving as thesis advisors for Ph.D. students; (b) average enrollment needed to maintain a critical mass of Ph.D. students; and (c) minimum acceptable graduation rates. These criteria should

be presented as an appendix to Math's next Program Assessment report, and subsequent annual assessment reports should include brief progress reports on progress toward meeting these criteria.

3. Compile the information that will be needed to make a determination about continuing the Ph.D. program in 2010.

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Susan Henrichs  
Dean of the Graduate School and Vice Provost

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Paul Reichardt  
Provost