



College of Natural Science and Mathematics
Office of the Dean

MEMORANDUM

To: Paul Reichardt, Provost

From: Joan Braddock, Dean *JB*

Date: 12 June 2006

Subject: Program Review — Department of Mathematics and Statistics Programs

Attached is my review of the programs in the Department of Mathematics and Statistics. I have not yet received the review from the external committee for the Atmospheric Science Program. Thus, my review of that program will be delayed until sometime after I receive their report.

Cc: Dana Thomas, Dept. Chair
CNSM Files



Dean's Evaluation

By Joan Braddock, Dean

12 June 2006

Program Review—2005-2006; Department of Mathematics and Statistics

Programs: BA, BS, MS, MAT, PhD Mathematics
BS, MS Statistics

Introduction

My evaluation of the programs in the Department of Mathematics and Statistics (DMS) follows the outline provided by the Provost for dean's reviews. I have added some additional comments at the end of my report addressing issues brought up by the department and by the external review committee.

1. **Quality of Graduates:** There are a number of indicators that the DMS is doing a good job with training graduates, particularly at the bachelor and master degree levels. Some indicators that undergraduate math majors are of high quality include: (1) excellent results compared to other students in the ETS major field test. Over the seven years this test has been required of math majors, our students scored at least in the 76th percentile and for four years scored in the 95th percentile, (2) students from UAF were competitive in national events including the Math Modeling Contest and Putnam Exam, and (3) at least for majors who have been tracked post graduation, UAF math majors have done well with employment in positions using their math degree or with going on to graduate school. Similarly, for the seven students receiving M.S. degrees in math since 2000, two are now instructors in math programs and five are in high quality PhD programs at various institutions. All of the MS graduates published a peer-reviewed publication (journal article or conference proceeding).
- There were no students graduating with MAT or PhD degrees in math during the program review period. However, six students were enrolled in the PhD program (as compared to 0 in 1999). The PhD program is perhaps the weakest program in the department for a number of reasons including of a lack of resources to offer a diverse graduate curriculum. All the PhD students currently enrolled have the same faculty advisor. While the program is not particularly costly, we will probably need to continue the discussion of whether we should support this degree into the future. Since no students have graduated yet, it is difficult to assess the quality of the degrees we are offering to them. I believe we should consider eliminating the MAT program. While it does not cost money, it also does not seem to be a useful degree (as evidenced by no students in the program). Perhaps, students interested in math education would be as well served with an interdisciplinary degree program until a decision is made on whether or not to work toward an education master's that is more appealing and more accessible to students interested in mathematics education.

For statistics programs, seven students received BS degrees in statistics during the review period, six of them were double degree seeking students and one had a degree in science already. Thus, the degree appears to serve students by providing them with tools for quantitative science. The master's degree program typically has 4-6 students enrolled. The department provided a nice history of where many of the graduates from that program are now working. Many graduates of the MS program in statistics work in jobs in Alaska or go on to graduate school. The evidence provided indicates that, while the number of students who major in statistics are fairly low, the quality of the students and the training they receive makes them highly competitive for jobs or further graduate school opportunities.

2. **Quality of Service Courses:** The DMS has a very important role in providing service courses (from 100 through 600 level courses) for programs at UAF. In fact, the high demand for service course, results in substantial challenges for the department in balancing the needs of majors and upper division students with the demands of the UAF core. The department has taken its role of service to the university very seriously. The department has done a very good job of tracking success (or lack thereof) and retention of students, particularly in 100 and 200 level service classes. A number of changes have been made by the department to try to improve student success in these courses. The most significant change during the review period was the increase from 3 to 4 credits for Math 107 based on success with this modification by TVC. The one negative of this change was that it stretched the department's already small faculty even further. An additional full time instructor in the department would allow a more reasonable number of sections of 100 level courses to be taught and would help with issues related to coordinating activities in the Math Lab as well as coordination of 100-level courses.

Math also provides a large number of service courses at the upper division level. Enrollments in most upper division math courses are fairly high (about 25 students on average during the review period) and in some cases upper division courses are offered that are only offered as service courses (that is they are not appropriate for math majors). Similarly at least four graduate courses offered by the math department are offered primarily as service courses. While it is perhaps somewhat more difficult to assess the quality of these courses relative to the programs, they support, it was clear from the report provided by DMS that the department has been responsive to making changes when appropriate as changes occur in other degree programs. The department is also stretched with being able to meet the demand for upper division service courses and provide reasonable number of courses for majors with the current faculty in the department.

Overall, the department has proposed additional changes that should help improve student success at the lower division by better placement through use of a required placement exam. Most of the logical strategies for improving student success will require at least some additional resources. For example, resources for

additional faculty to teach courses, and for faculty/student support to improve the Math Lab.

Statistics also provides a substantial service function at UAF. Courses in statistics tend to be in high demand, one indicator that they are useful to students. An issue with quality of the statistics programs is retention of high quality faculty. Beginning next year all four faculty positions will be filled. It is an outstanding group of faculty and I am committed to do what I can as dean to retain these faculty.

3. **Scholarship of Faculty:** The program review committee highlighted the flexibility of the faculty in DMS. In general, faculty teach a wide diversity of courses. Most faculty in DMS have workloads assigning a majority of their time to teaching. However, faculty in the department have fairly consistently maintained modest but active research programs. For example, from data provided in the report summarizing peer-reviewed publications in 2002-2003, all but one faculty member had published in that year with many faculty co-authoring or authoring two papers that year. One faculty member published 10 papers in that year. Many faculty in the department already collaborate with faculty in other units on campus. I would like to see increased interaction with other departments and would hope that in the future at least some DMS faculty could be hired into joint appointments with one of the research institutes on campus. From the DMS 2005-2006 Self-Study Update, the statement was made that "the department is cost effective because faculty salaries are relatively low compared to other areas in our college." I have examined college faculty salary data to see if this statement is true. I have not yet thoroughly examined the data but did not find that math faculty cluster at the bottom for the college for any academic rank. What seems to be more consistent in determining who has the lowest salaries in the college is the year faculty member was hired. Thus, there are relatively poorly paid faculty in nearly every department.
4. **Cost Effectiveness:** Please see attached tables. The DMS ties with the Department of Biology and Wildlife for number of SCH. Each department accounts for about 27% of the SCH produced by the entire college (collectively accounting for about 54% of the SCH produced in the college. However, it is somewhat difficult to compare the two departments directly from a resource perspective because of the nature of the disciplines and the different missions of the departments. From a strictly financial analysis, the DMS is very efficient relative to cost per SCH. Only 17% of the college's instructional budget was allocated to the DMS in 2005-06 relative to 27% of the college's SCH production. However, the DMS only has between 5 and 6 % of the majors in the baccalaureate, master's or PhD levels in the college. Faculty FTE are about 20% of the total in the college, compared to Biology and Wildlife with about 24% of the college's FTE's.

5. Relation to UAF Mission, UAF Strategic Plan, UAF Academic Development Plan, and service/outreach efforts of faculty: The relationship of the programs in the department to UAF2010 was well documented by the external review committee.
6. Evidence of programmatic planning to achieve curricular goals, faculty and staffing goals, and overall effectiveness of programs: In general, the DMS has done a very good job with outcomes assessment and with responding to results from outcomes assessment. In addition, the department has responded to changes in other programs that affect their courses. Math programs, with the exception of the PhD program for which there were no graduates during the review period, have had fairly consistent outcomes assessment. A number of changes have been made as a result of outcomes assessment and the desire to improve student success, particularly in service courses where students have a wide range of preparedness for the courses. A major change during the review period was the increase for Math 107 from 3 to 4 credits. For statistics, the graduate program has undergone more consistent review through the outcomes assessment process than the undergraduate program. However, the department did express a commitment to be more systematic in the future with outcomes assessment of the undergraduate programs. Overall, the department has done a very good job at collecting data, evaluating data and responding with changes.
7. Other issues brought up during the review:
 - a. Faculty issues: Going into the FY07 academic year, faculty numbers in DMS still seem to be low relative to demand for course offerings, but there are now 13 FTE faculty in the department (not counting Bueler and Faudree who have negotiated 75% contracts) compared to a high of 10.5 during the review period. It would seem that the increase should translate into a better situation with respect to addressing teaching needs of both service courses and majors courses in the department. However, FY07 is a particularly difficult year as there are several new faculty with teaching releases as well as two faculty with a negotiated semester leave of absence. In addition, in past years the department has relied heavily on adjuncts and often on term hires. As permanent positions have been filled, the resources for adjuncts and term positions have been reduced. We will need to continue to work toward attaining a level of full time permanent faculty that will meet the substantial needs of service courses while maintaining high quality majors programs. A more troubling issue is faculty turnover in the DMS. We have made some excellent hires in the past two years. I will do what I can to retain faculty in the DMS. Salaries are incrementally improving and new faculty have generally been hired at or near target salaries. Faculty development funds and TA support are also factors influencing faculty satisfaction. I have requested funds for additional TA support for math that will assist with teaching and math lab activities and provide additional support for math graduate students.

Faculty development money is likely to remain a problem into the foreseeable future.

- b. **Space:** Space is a severe problem for both math and computer science. I should be able to help with (with modest financial support and lobbying support) some of the short-term issues like adequate board space in classrooms and ceiling mounted projectors in rooms used for teaching math courses. It would also be very helpful if the Alaska Native Languages program materials could be entirely removed from the Penthouse. In addition, I am happy to lobby for moving the Math Lab to the first floor and the modifications that would follow. However, all of these issues will require resources not allocated at the college level. In addition, for longer-term space needs, we (UAF) needs to have a process that at least puts space needs on a list somewhere. As is, there is no clear mechanism to even make it known that a space problem exists (even if the issues cannot be addressed in the foreseeable future). Chapman is already over capacity. Any expansion in any programs at UAF will put demands on the DMS, requiring additional part-time and perhaps permanent faculty and space.

Table 1. Cost Analysis of Instruction (data from 2005-06 unless otherwise noted)

Data Element	CNSM	ATM	B&WL	CHEM	G & G	PHYS	MATH	CS
¹ SCH	15,169	119	4,023	2,555	1,808	1,566	4,085	1,013
Baccalaureate majors	650	0	324	67	43	47	42	127
² Master's majors	168	5	62	17	50	11	8	15
² PhD majors	128	9	50	19	31	13	6	0
Instructional budget	\$8,010,063	\$179,624	\$1,912,977	\$1,377,287	\$1,360,137	\$905,367	\$1,385,995	789,569
Faculty FTEF-regular	63.85	1.75	16	8.6	9.25	7.25	13.5	7.5
Faculty FTEF-adjunct	17	0	2	1	0	4	7	3
Staff FTE- regular	15.375	.25	4	3	3.125	2.5	1	1.5
Staff FTE- student (grad TAs)	75.5	.5	27	13	14	8	9	4

¹Data from Fall 2004

²1 MS and 4 PhD designated as CNSM interdisciplinary

Table 2. Cost Analysis of Instruction: Percent of Total

Data Element	ATM	B&WL	CHEM	G & G	PHYS	MATH	CS
¹ SCH	<1	27	17	12	10	27	7
Baccalaureate majors	0	50	10	7	7	6	20
² Master's majors	3	20	10	30	7	5	9
² PhD majors	7	39	15	24	10	5	0
Instructional budget	2	24	17	17	11	17	10
Faculty FTEF-regular	3	25	13	14	11	21	5
Faculty FTEF-adjunct	0	12	6	0	71	41	18
Staff FTE- regular	2	26	20	20	16	7	10
Staff FTE- student (graduate TAs)	1	36	17	19	11	12	5

¹Data from Fall 2004

²1 MS and 4 PhD designated as CNSM interdisciplinary