Mathematics and Statistics

Master of Science in Mathematical Science (97)

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UNIVERSITY OF ARKANSAS AT LITTLE ROCK Plan No. 97
Assessment Progress Report Form - Calendar Year 2005

Assessment period January 1 through December 31, 2005

Use of Assessment for Program Building and Improvement:

1. *Findings of the past twelve months, assessment activities*. The Department of Mathematics and Statistics uses seven assessment instruments to assess the M.S. in Mathematical Sciences program. These instruments are the written comprehensive exam, the oral comprehensive exam, presentations in course work, the student portfolio, the alumni survey, the employer survey, and professional association reports.

Breadth and Depth: Six students took the written comprehensive exam in 2006. The written comprehensive exam covered all four of the core courses: Advanced Differential Equations; Advanced Linear Algebra; Advanced Numerical Analysis I; and Mathematical Statistics I. (Numerical Analysis and Statistics are the fundamental ingredients of any Applied Math curriculum, Linear Algebra is needed for better understanding of Statistics and Numerical Analysis, Differential Equation is the strong point of this program.). Each section of the exam covered one of the four core courses and each section was graded by two members of the graduate faculty. A score of 70 was considered a passing grade. The average score for the Advanced Numerical Analysis was much higher than the average scores for previous years. . The average score for the Advanced Differential Equations was much lower than the average score for 2004 and has been declining. The reason is under investigation. These scores are summarized in the Table below.

Average	Linear Algebra	Advanced D E	Numerical Analysis	Mathematical Stat I
Previous years	89.8	88.2	86.3	84.7
2005	89	78	95.3	87.3
	2005 performance			
Student 1	89	79	100	80
Student 2	85.5	84	90	87
Student 3	88	76	90	86
Student 4	85.5	79	100	97
Student 5	88	75	100	89
Student 6	98	75	92	85

Depth and breadth of knowledge are two items in the portfolio. The 2005 average scores were 4.6 and 4.5 respectively (4 = very good). There is not much change from previous years. The 2001-2005 scores are summarized in the Table below.

Year	Depth	Breadth
2001	3.6	3.7
2002	5	5
2003	4	4.3
2004	4.6	4.5
2005	4.6	4.5

2005 Performance

Student 1	4.67	4.67
Student 2	4.3	4.0
Student 3	4.3	4.3
Student 4	4.7	4.7
Student 5	5	5

There are four questions on the verbal communication rubric related to depth and breadth of mathematical knowledge: Use of appropriate terminology; Background Material; Analysis; and Conclusions. This was the fourth year that the Department gathered data using the verbal communication rubric. The average in each category was above a 4 (very good) in four straight years. The results are summarized in the table below.

2005 Performance

	Terminology	Background	Analysis	Conclusions
Student 1	4.6	4.3	4.6	4.4
Student 2	4.2	4.6	4.6	4.6
Student 3	4	4	3.8	3.8
Student 4	5	4.7	5	4.3
Student 5	4.7	4.3	4.7	4.7
Average	4.5	4.4	4.5	4.4

Verbal Communication: The Department of Mathematics and Statistics uses verbal communication skills as part of our M.S. program assessment for 2004. Five students had an oral comprehensive exam. The comprehensive exam was graded by the student's committee. 2003 is the first year every student is required to take oral exam. We see some improvement. These results are summarized in the table below.

	Clarity	Delivery	Style
2003	4.3	4.1	4.1
2004	4.5	4.7	4.7
2005	4.4	4.6	4.3

Faculty and Stake Holder Involvement:

1. *Involvement of the faculty in the assessment process*. The graduate coordinator meets with each graduate faculty member several times this past year to talk about the improvement of the program. In addition to being members of the Gold Committee, all of the graduate faculty members have direct contacts with the graduate students. All members of the graduate faculty serve on at least one student's graduate committee and many serve on several committees. The duties of the committee include reviewing and grading portfolios, reviewing the student's thesis/project, should the student elect to do a thesis/project, reviewing the grades of the comprehensive exams, grading the student's oral presentation, and reviewing and commenting on the student's annual progress. The table below lists the graduate faculty and the number of student graduate committees they on.

Faculty	# Committees	Faculty	# Committees
Dan McCallum	9	Hassan Elsalloukh	6
Cassandra Cox	6	Thomas Peter	4
Eric R. Kaufmann	4	Xiaoshen Wang	6
Nickolai Kosmatov	4	Xiu Ye	4

Furthermore, the members of the graduate faculty create and the grade the written comprehensive exam. Each section of the written comprehensive exam is composed by the faculty members who teach the relevant core course. Each section is then graded by at least two faculty members who have expertise in that area. Members of the graduate faculty are also required to attend each student's oral comprehensive exam. The student's graduate committee evaluates the candidate's performance.

1. *Stakeholder involvement in assessment*. In the Fall 2002 semester, the Department created a Colloquium Committee consisting of the graduate coordinator, a non-tenured faculty member and a graduate student. The charge of the committee was to increase participation in departmental colloquia. The Colloquium Committee recommended that the department have at least five presentations each semester: a presentation from a faculty member; a skills development workshop; a presentation from a member of the local community; a presentation from a graduate student; a presentation from an undergraduate student.

Each student is required to form a graduate committee during the candidate's first semester. The student chooses the Chair of the committee and one other graduate professor to be a member. The graduate coordinator chooses the third member of a student's committee. The Graduate Student Advisory Committee consists of three graduate students. The charge of the Graduate Student Advisory Committee is to provide feedback on the quality of the M.S. program in Mathematical Sciences. The Graduate Student Advisory Committee will meet with the graduate coordinator at least once per semester. The graduate students have met informally with the graduate faculty during the past and discussed the program. The Graduate

Student Advisory Committee revised verbal rubric in 2005 and also provided some ideas on how to improve the program. Their main concern is more support from the department.

Alumni and Employers are involved through surveys. The last year that survey data was collected was 2001. We had a low rate of return for the surveys. Members of the department have discussed the low rate of return and recommend that the survey be conducted by the University as a whole.

Approach:

1. *Program goals*. The primary mission of the University of Arkansas at Little Rock is to serve the educational needs of central Arkansas and, in particular, to offer programs and services that meet the special needs of its diverse student body in its metropolitan location. The M.S. degree in Mathematical Sciences, offered through the Department of Mathematics and Statistics, is consistent with this mission. The goals of the program are
    a. To develop advanced modeling and problem solving skills.
    b. To prepare our students to enter a Ph.D. program in mathematics, statistics, or applied mathematics.
    c. To prepare our students to be employed and act in a consulting capacity on matters concerning mathematics and statistics.

2. *Program objectives*. It is expected that all students receiving the Master of Science degree in Mathematical Sciences from the University of Arkansas at Little Rock will possess knowledge and skills in the following areas:
    a. *Mathematical Software*. Each candidate for the M.S. in Mathematical Sciences will demonstrate a proficiency in mathematical software. In particular, each candidate will demonstrate a working knowledge of the mathematical software packages Maple and SAS. These skills will help the student
    b. *Communication*. Each candidate for the M.S. degree will have communication skills necessary to express mathematical ideas in oral and written forms, to use the language and symbolism of mathematics, and to present mathematical concepts, proofs, and solutions of problems in an appropriate manner
    c. *Breadth and Depth*. Each candidate for the M.S. degree will develop a breadth of mathematical knowledge beyond the bachelor degree. Furthermore, each student will develop a deeper an understanding in one area of specialization.
3. *Methods used to measure objectives assessed this year*. This year, the department assessed program objectives (**2a**) through (**2c**). The following table gives the instruments that were used to evaluate each of these objectives. (WCE = Written Comprehensive Exam, PC = Presentation in Coursework, OCE = Oral Comprehensive Exam.)

Program Objective	**Assessment Instrument**
Mathematical Software	Portfolio, WCE
Verbal Communication	PC, OCE
Breath and Depth	Portfolio, WCE, PC, OCE

4. *Changes resulting from assessment feedback and future plans*. As results from feedback on the assessment of the graduate program, we have made and plan to make some changes as listed below.

a. We assigned mentors and give training sessions for new graduate TA's.
b. Faculty members will give graduate students guided rehearsals before their formal presentation.
c. Some new material has been added to our website to attract good students.
d. New admission requirements such as GRE and letters of recommendations are added to make the program more competitive.
e. A new course, SAS programming, has been added to the program to better prepare students in Applied Statistics emphasis.
f. An additional office has been provided for grad students (they still need more space).

Timeline for future assessment activities. The following table gives the timeframe for future assessment activities. Because they involve relatively small population sizes, the alumni and employer surveys will be conducted every three years, (2004, 2007,…), and will involve more than one graduating class. The graduate committee for a given student will be formed by the end of that student's first semester. Once a year, in the spring, the candidate's committee will evaluate the candidate's portfolio. The written and oral comprehensive exams are given on demand.

Program Objective	2002	2003	2004	2005	2006	2007
Mathematical Software	PW		PWAE		PW	
Verbal Communication	CO	CO	COAE		CO	
Written Communication		PW		PWAE		PWAE
Depth and Breath	PWO	PWO	PWOAE	PWO	PWO	PWOAE
P=Portfolio, W=Written Comprehensive Exam, O=Oral Comprehensive Exam, C=Presentations in Coursework, A=Alumni Survey, E=Employer Survey						