

ASSESSMENT WEBSITE INFORMATION

College: Sciences and Mathematics

Degree Program: Mathematics MS

Chair/Director: Debra Ingram

DATA SAY:

Students pursuing the M.S. Mathematics degree at Arkansas State University can loosely be placed into three categories:

- (1) graduate students interested in both mathematics and statistics;
- (2) graduate students mainly interested in mathematics;
- (3) graduate students mainly interested in statistics.

SO WHAT:

To serve these three populations, the Department of Mathematics and Statistics offers a curriculum for the M.S. Mathematics degree program that includes courses in pure and applied mathematics and theoretical and applied statistics. The core curriculum and most electives are offered on an every-other-year rotation. A typical and current two-year cycle of graduate course offerings, from which full-time M.S. Mathematics students select at least 12 courses, is shown below in Table I. The current rotation of courses is a good fit for students in category (1) – those interested in both mathematics and statistics; and a fairly good fit for students in category (2) – those mainly interested in mathematics. However, the current rotation lacks enough content in statistics to be a good fit for students in category (3) – those mainly interested in statistics. We want to strengthen our program in statistics without sacrificing course offerings in mathematics.

CURRENT ROTATION	- M.S. Mathematics students select 12 courses (36 hours) over a two-year period from the following. - The current rotation is a good fit for category (1) -- students interested in both mathematics and statistics; and a fairly good fit for category (2) -- students mainly interested in mathematics. However, it lacks enough statistics content to be a good fit for category (3) -- students mainly interested in statistics.		
	Fall Semester	Spring Semester	Summer Session
Year 1	CHOOSE 2-3 COURSES FROM: (M) Real Analysis I (M) Partial Differential Equations* (S) Applied Linear Models I (S) Mathematical Statistics I	CHOOSE 2-3 COURSES FROM: (M) Real Analysis II (M) Applied Mathematics (M) Numerical Methods** (S) Applied Linear Models II (S) Mathematical Statistics II	CHOOSE 0-2 COURSES FROM: (M) Number Theory (M, S) Probability
Year 2	CHOOSE 2-3 COURSES FROM: (M) Complex Analysis I (M) Abstract Algebra II (M) Partial Differential Equations* (S) Statistical Methods w/ SAS Programming	CHOOSE 2-3 COURSES FROM: (M) Complex Analysis II (M) Abstract Algebra II (M) Numerical Methods** (S) Multivariate Statistics	CHOOSE 0-2 COURSES FROM: (M) Advanced Linear Algebra (S) Time Series Analysis

(M) = mathematics, (S) = statistics, (M,S) = both mathematics and statistics

*offered every fall, ** offered every spring

Table 1. Current rotation of graduate course offerings



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HOW WE CHANGED:

- (1) The department is proposing the M.S. Statistics degree program. The department has made strategic hires over the last four years to increase the number of faculty in statistics. This includes both tenure-track Ph.D. faculty and non-tenure-track instructors. Also, some sections of STAT 3233, Applied Statistics I, are now being taught by qualified non-tenure-track instructors instead of Ph.D. faculty. This change allows more graduate-level statistics courses to be offered.
- (2) The department began identifying ways to change the course rotation to strengthen the M.S. Mathematics program for students who are mainly interested in mathematics. These students want more math content and less statistics content in their degree plan.
- (3) The department began exploring an appropriate level of flexibility in the M.S. Mathematics and/or M.S. Statistics degree programs to retain a program that is a good fit for students who are interested in both mathematics and statistics. These students want content from both areas in their degree plan.

WHAT WE GOT:

The department has identified some realistic curriculum and graduate course rotation plans that support the M.S. Mathematics and the M.S. Statistics degree programs AND meet the needs of students in the three categories: (1) interested in both mathematics and statistics; (2) mainly interested in mathematics; and (3) mainly interested in statistics. An example is given below in Table II.

CURRICULUM AND GRADUATE COURSE ROTATION SUPPORTING M.S. MATHEMATICS AND M.S. STATISTICS -- EXAMPLE			
	Fall Semester	Spring Semester	Summer Session
Year 1	(M) Real Analysis I (M) Numerical Analysis I (M) Applied Mathematics (offered every fall) (S,SC) Applied Linear Models I (S) Design of Experiments (S) Bayesian Statistics	(M) Real Analysis II (M) Numerical Analysis II (M) Partial Differential Equations (S,SC) Applied Linear Models II (M,S,SC) Theory of Linear Models (M,S, SC) Distribution Theory	(M) Number Theory (M, S) Probability
Year 2	(M) Complex Analysis I (M) Abstract Algebra II (M) Applied Mathematics (offered every fall) (S,SC) Univariate Statistical Methods w/ SAS (S) Categorical Data Analysis (S) Survival Analysis	(M) Complex Analysis II (M) Abstract Algebra II (M) Numerical Methods (M,S, SC) Inference Theory (S, SC) Multivariate Statistical Methods (S) Nonparametric Statistics	(M) Advanced Linear Algebra (S) Time Series Analysis
(M) = mathematics, (S) = statistics, (M,S) = both mathematics and statistics, (SC) = statistics core			

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WHAT WE GOT (CONT.):

Implementing this plan would require that the following issues be investigated:

- (1) The proposed rotation of graduate courses involves offering two extra graduate courses each semester. How can we cover additional courses with our limited faculty resources?**
- (2) With separate graduate degrees in mathematics and statistics, how should the department build in the appropriate level of flexibility to retain a graduate curriculum that is a good fit for students who are interested in both mathematics and statistics?**

One possibility is the structure provided below:

M.S. Mathematics requirements (36 hours total):

- At least 27 hours of course work designated as mathematics (M). Courses designated as both mathematics and statistics (M, S) may be used to satisfy this requirement. Thesis hours with a MATH prefix may be used to satisfy this requirement.**
- A maximum of 9 hours of course work designated as S (statistics only). Thesis hours with a STAT prefix count as statistics.**
- Coursework must include at least three sequences from Real Analysis I-II, Complex Analysis I-II, Numerical Analysis I-II, Abstract Algebra I-II, or Applied Linear Models I-II.**

M.S. Statistics requirements (36 hours total):

- At least 30 hours of course work designated as statistics (S). Courses designated as both mathematics and statistics (M, S) may be used to satisfy this requirement. Thesis hours with a STAT prefix may be used to satisfy this requirement.**
- A maximum of 6 hours of course work designated as M (mathematics only). Thesis hours with a MATH prefix count as mathematics.**
- Coursework must include the 21-hour statistics core curriculum (SC): Applied Linear Models I, Applied Linear Models II, Theory of Linear Models, Distribution Theory, Inference Theory, Univariate Statistical Methods with SAS, and Multivariate Statistical Methods.**

