

Institutional Effectiveness Report
Academic Year 2013-14
Department of Mathematics

Mathematics Program Report

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Program Mission and Goals

- A primary purpose of the Department of Mathematics at Francis Marion University is to offer all University students a varied and well-balanced curriculum of undergraduate education in mathematics. In the liberal-arts tradition, the courses in the curriculum teach students to think logically, to analyze problems and solve them appropriately, and to communicate their ideas clearly.
- The Department also provides a broad range of entry-level courses in order to meet the needs of students with widely varying mathematical backgrounds and provide them with skills appropriate for their selected majors.
- Equally important, the curriculum provided by the Department leads to baccalaureate degrees in two distinct but overlapping areas: mathematical sciences and teacher certification in mathematics. These courses prepare students for careers in education, business, industry, and government. They also prepare those students of sufficient interest and ability for further study of mathematics at the graduate level.
- The Department also offers graduate courses in support of the post-baccalaureate program in teacher re-certification.
- The Department provides experiential learning activities for its majors such as travel to local, regional, and national conferences, field trips to local industries, student research and internships, competition in national modeling contests, and employment in labs and recitations. These experiences expand upon the concepts learned in the classroom and add practice and observation components to complete the learning cycle. Participation in these activities better prepares students for careers after graduation.
- To maintain the vitality of the Department and enhance the University's teaching mission, members of the Department undertake new course development, conduct research in discipline or related area, or pursue other avenues of faculty development.
- The Department serves the regional community by hosting the annual Pee Dee Regional High School Mathematics Contest and the annual Advanced Placement Calculus Practice Exam. The Department serves the mathematics community by hosting the annual Francis Marion Undergraduate Mathematics Conference and by judging the national High School Mathematical Competition in Modeling (HiMCM). The Department faculty members also participate in various workshops, science colloquiums, science fairs, and other programs that enrich the educational and cultural experiences of the region.

Assessment Activities

The Department of Mathematics uses several assessment tools, such as an internal Exit Exam, an internal Senior Survey, the University student and course evaluations, and the external Praxis II mathematics test. Faculty service and scholarship are assessed using faculty annual reports.

Assessment	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	
Mean Exit Exam score on required portion ¹	Not administered	Administered but not graded in Spr 2008	62	34	72	52	Not administered ¹⁰	Not administered ¹⁰	
Percentage of graduating students known to be accepted to Graduate School or offered Position in Teaching, Business, Industry, or Gov't ²	Not requested	50%	62.5%	50%	0% ⁹	50%	50%	50%	
Happiness in majoring in mathematics ^{3,8}	1.09	1.25	1.36	1.3	1.7	1.75	1.3	1.4	
Helpfulness in mathematics courses ^{3,8}	1.64	1.5	1.55	1.7	1.7	1.75	1.6	1.6	
Effectiveness on mathematics instructors ^{3,8}	1.55	1.5	1.73	1.6	1.7	1.625	1.7	1.5	
Quality of the mathematics program ⁸	1.914 ⁴	1.604 ⁴	1.915 ⁵	1.705 ⁵	2.3 ⁵	2.0 ⁵	1.6 ⁵	1.5 ⁵	
Quality of instruction ⁶	1.89	1.89	1.79	1.55	1.91	1.65	1.67	1.44	
Availability of instructor outside the classroom ⁷	1.5	1.51	1.52	1.37	1.66	1.39	1.45	1.12	
Overall quality of course as a learning experience ⁶	1.91	1.89	1.79	1.58	1.94	1.64	1.79	1.46	
Percentage of students who passed the Praxis II Math Content Knowledge score ⁸	100%	100%	100%	100%	100%	NA	100%	-	50% ¹¹
Percentage of students who passed the Praxis II Math Proofs and Models score ⁸	100%	100%	100%	100%	100%	NA	50%	100%	
Number of scholarly activities by math faculty ⁸	19	40	24	28	22	33	32	29	
Mean number of experiential learning activities for each Math 499 student	Not requested	Not requested	4.0	1.9	2.0	3.75	4.1	4.1	

1. Exit Exams scores are out of 100 points and were introduced in Spring 2008, but scores were not been recorded until Fall 2008.

2. Percentage success as stated during Exit Interview which began in Spring 2008.

3. Data recorded from Senior Survey based upon a four point scale (1-strongly agree, 2-agree, 3-disagree, 4-strongly disagree).

4. Data recorded from Senior Survey based upon a five point scale (1-excellent, 2-good, 3-adequate, 4-fair, 5-poor).

5. Data recorded from Senior Survey based upon a revised four point scale (1-excellent, 2-good, 3-fair, 4-poor). See Appendix for Senior Surveys.

6. Data recorded on University Course and Instructor Evaluations in 300-level and 400-level math courses (1-excellent, 2-good, 3-fair, 4-poor, 5-cannot rate).

7. Data as recorded on University Course and Instructor Evaluations in 300-level and 400-level math courses (1-very satisfied, 2-satisfied 3-dissatisfied, 4-very dissatisfied).

8. See Appendix for data.

9. Of the three students completing the Senior Survey, one student is completing his student teaching in the fall. We are very confident that he will be offered a teaching position when he graduates in December which will result in a change from 0.0% to 33.3%.

10. The ETS Major Fields Exam was administered instead of the Exit Exam in an attempt to obtain national percentiles of participants.

11. Praxis II Mathematics Content Knowledge Test (0061) and Proofs and Models Test (0063) were replaced by Mathematics Content Knowledge Test (5161) in 2013.

Issues of Concern	Actions Taken
<i>Number of mathematics majors</i>	Establishment of the Allen Mathematics Scholarship awarded to an outstanding mathematics major.
<i>Success of students in calculus courses</i>	Proposal approved for lab section of Calculus I (Math 201L) to be offered in Fall 2010. <i>However, sufficient enrollment is still a concern.</i>
<i>Low enrollment in Math 201L</i>	Identify incoming calculus-eligible students during the summer.

Appendices

Summary of Selected Student Responses from Mathematics Senior Survey 2013-14

2	I am glad that I majored in mathematics.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
				3	5	
3	I feel the overall quality of the library resources in mathematics are:	<i>poor</i>	<i>fair</i>	<i>good</i>	<i>excellent</i>	1 N/A
		1	1	4	1	
4	I would rate use of technology (graphing calculators or computers) with the Mathematics Program as:	<i>poor</i>	<i>fair</i>	<i>good</i>	<i>excellent</i>	1 N/A
				2	5	
5	The projects/homework assignments in my courses were beneficial in helping me gain knowledge of the material presented in class.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
				2	6	
6	The quantity (number) of projects/homework assignments in your mathematics courses in terms of how many you feel were necessary for you to learn the material was on the average:	<i>far too few</i>	<i>slightly too few</i>	<i>about right</i>	<i>slightly too many</i>	<i>far too many</i>
				7	1	
7	The variety and complexity of the projects/homework assignments in your mathematics courses in terms of how much you feel was necessary for you to learn the material were on the average:	<i>far too simple</i>	<i>slightly too simple</i>	<i>about right</i>	<i>slightly too complex</i>	<i>far too complex</i>
				8		
8	The number of mathematical experiential activities, such as employment, field trips, or any other outside classroom activity, which you participated in	1				
		3				
		11				
		3				
		3				
		1				
		7				
		3				
8	I found these mathematics courses to be most profitable:	304, 306, 407, 405				
		202, 203, 230, 306, 312, 405, 345, 315				
		201, 202, 307				
		301, 304				
		230, 201, 202, 310				
		425, 306				
		132, 203				
		230, 409, 499				
9	I found these mathematics courses to be least profitable:	311				
		311, 499				
		111				
		499				
		203, 306				
		203				

		301, 222, 212				
		310				
10	List any courses/subject areas in mathematics you feel you should have had but were not offered.	--				
		--				
		Advanced PDE, Functional Analysis, Statistical Mechanics				
		Complex Analysis				
		--				
		Calculus applied/real world problem solving class				
		--				
		311 (Offered but not at the right time)				
11	Overall, I feel the requirements in the courses in my major were:	<i>far too severe</i>	<i>somewhat severe</i>	<i>adequately demanding</i>	<i>somewhat easy</i>	<i>far too easy</i>
				7	1	
12	Overall, the mathematics courses I took were profitable.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
				5	3	
13	Overall, the mathematics instructors I had were effective.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
				4	4	
14	I was advised effectively by the mathematics faculty.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
			1	4	3	
15	I found these mathematics instructors to be most effective:	Scott, Buck				
		Ramey, Fitzkee, Newman, O'Kelly, Scott, Schnibben				
		Self-Paced courses				
		Scott, Ramey				
		Ramey, Buck				
		Newman				
		Arroyo, O'Kelly				
		Ramey				
16	a) I had these problems with the operation of the Mathematics Program:	None				
		None				
		Individual Instructors				
		None				
		Scheduling Problems				
		None				
		Advising Problems				
		Course Content				
17	The problems I experienced were handled effectively by the mathematics faculty.	<i>strongly disagree</i>	<i>disagree</i>	<i>agree</i>	<i>strongly agree</i>	
				4	4	
18	What do you consider to be strong points, if any, of the program in mathematics at FMU?	Helpful, knowledgeable, professional				
		Organization, instructors, reliability of instructors				

		Scheduling, Professionals								
		Conference and faculty								
		Professors willing to help even outside office hours; classroom experience enjoyable								
		Small classes, especially in upper lever								
		--								
		Availability of teachers; <u>All</u> of them very very helpful								
19	What do you consider to be weak points, if any, of the program in mathematics at FMU?	--								
		None								
		A lack of application courses, maybe								
		Maybe some faculty								
		I don't believe I saw any								
		Classes not being offered or at limited times								
		Some professors always teach the same courses. The dean is also a professor and advisor, Taking tests outside of class								
		I would like to be more pushed, at least a little bit								
		--								
		Require 425 and CS 226								
		More in class interaction would help the learning process								
		--								
		I understand why classes are always offered or only at one time								
		Dean only have 2 positions or less; Professor rotation teaching classes								
		--								
21	I would like to see these changes made in the Mathematics Program:	Closer evaluation of transfer credits/grade for math classes								
		None								
		Require 425 and CS 226								
		--								
		I can't think of any changes								
		--								
		Listed in 18 (Comment: ? There was nothing listed in # 18)								
22	I would rate the overall quality of the Mathematics Program at Francis Marion as:	<table border="1"> <thead> <tr> <th><i>poor</i></th> <th><i>fair</i></th> <th><i>good</i></th> <th><i>excellent</i></th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>4</td> <td>4</td> </tr> </tbody> </table>	<i>poor</i>	<i>fair</i>	<i>good</i>	<i>excellent</i>			4	4
<i>poor</i>	<i>fair</i>	<i>good</i>	<i>excellent</i>							
		4	4							
23	Which person(s), if any, at FMU do you feel contributed the most to your education and why?	--								
		Ramey, Fitzkee, O'Kelly, Newman, Scott, Whitmire								
		Ramey, Buck								
		Szurley, Scott, Fitzkee								
		Ramey								
		--								
		Arroyo								
		All teachers have taught me something								
24	What are your immediate plans after graduation?	Moving to Japan and work on getting into grad school								
		Teach High School								
		Employment with USDA - ARS								

		Find a job; preferably Florence but elsewhere considered
		Find a position with computer science and use my math degree
		Going to work for Vanguard in August
		Join the Air force
		???
25	Have you been accepted to a graduate School or offered a position in Teaching, Business, Industry, or Government?	No
		No
		Employment with USDA - ARS
		Not yes
		No
		Going to work for Vanguard in August
		No
		No
26	Are your immediate plans related to your major?. Explain.	Yes, I plan to get a MAT or something similar to teach high school math
		Yes, teaching math
		Not really
		I would like them to be
		Find a position with computer science and use my math degree
		Attending grad school for Mathematical Finance Fall 2015
		No
		I would like to apply for my Masters
27	Do you feel that your undergraduate degree has adequately prepared you for your first job and/or graduate school? If not, in what areas do you feel your background was inadequate?	Yes
		Yes
		Over Prepared
		I feel it helped me sufficiently
		I believe my degree has prepared me
		Yes
		Yes
		Yes
28	What comments would you like to make about the mathematics program at FMU? (The comments could concern courses, curricula, faculty, facilities, etc.)	Frustrating to see Major GPA drop just by transferring; Faculty very friendly
		--
		Roll Tide
		More Complex classes; I feel that is one area I missed out on
		Continue to encourage students as you have encouraged me
		--
		--
		--

Praxis II Mathematics Exam Scores March 2013 through March 2014

Student ID ***71

8April2014 5161 Mathematics Content Knowledge
Score 160 Required State Score 160

Student ID ***98

21Sept2013 5161 Mathematics Content Knowledge
Score 155 Required State Score 160

9Oct2013 0063 Mathematics Proofs
Score 156 Required State Score 137

Faculty Scholarly Activities

Second component of the paper “The convergence of block cyclic projection with underrelaxation parameters for compressed sensing based tomography” concerning the convergence of the block cyclic projection algorithm with overrelaxation parameters.

Co-authored paper entitled “Multinets in P^2 ” to appear in *Experimental and Theoretical Methods in Algebra, Geometry and Topology, Proceedings in Mathematics & Statistics*, Ed. Ibaldula, D. and Veys, W., Springer-Verlag, 2014.

Presented talk entitled “Multinets in P^2 ” in the Special Sessions on Hyperplane Arrangements and Applications at the JMM in Baltimore in January 2014.

Presented “Multinets in P^2 induced via cancellation” at the AMS Southeastern Spring Sectional Meeting at the University of Tennessee in March 2014.

Presented poster entitled, “Heads or Tails when Flipping and Spinning” at the Carolinas Sports Analytics Meeting at Furman University in April 2014.

Presented “Block of Cheese Problem” to the Math Club in September 2013

Presented “Parity Problems in Math and Science” in the Science Symposium in January 2014.

Served as Honors Director for Honors Independent Study which explores the underlying mathematics for optimal strategies to win selected games from the television game show, “The Price is Right”.

Presented “Some Regularity Properties for Certain Dynamical Systems” at the Analysis Seminar at the University of Oregon in December 2013 and “Smallness and Comparison Properties in Certain Minimal Dynamical Systems” at the Great Plains Operator Theory Symposium at the University of California at Berkeley in May 2013.

Acceptance of two papers, “Crossed products by automorphisms with the tracial quasi-Rokhlin property” and “Smallness and comparison properties for minimal dynamical systems”, to appear in the online repository arXiv funded by Cornell University Library.

Awarded AP Summer Teacher Institute grant from the South Carolina Department of Education

Awarded QEP grant to take students to a Math Jeopardy competition at Coastal Carolina. FMU Students to CCU and won the competition!

Invited AP Calculus Reader for College Board to grade AP Calculus exams in Kansas City (11-17Jun).

Acceptance of “4-cycle Decompositions of $(\lambda+m)Ku+v$ with holes of size $(\lambda)Ku$ ” paper for publication in *Designs, Codes, and Cryptography*.

Collaborated with faculty from the School of Business on modeling forecasts based on his consulting work at Great Southern Wood Preserving this past summer in Alabama. The case was presented at the Southeast Case Research Association in February 2014.

Acceptance “Helping teachers connect writing to doing mathematics” for publication in the Journal of the Southeastern Regional Association of Teacher Educators.

Presented a talk “Writing in Geometry at the Secondary Level” at a Regional Conference and Exposition of the National Council of Teachers of Mathematics in Las Vegas, Nevada, in October 2013.

Presented a talk “But I Don’t Like Math!” at the annual meeting of the South Carolina Association of Teacher Educators at Limestone College in Gaffney in September 2013

Presented “The Mathematics Common Core State Standards and Mathematics Education at FMU” at a meeting of the School of Education of in August 2013.

Presented “Why So Many Problems in using Math and English in Classrooms and in Popular Culture? Through the Lens of Comic Strips – Part II” at the 2014 Popular Culture/American Culture Associations National Conference in Chicago in April 2014.

Presented a talk entitled “Introducing Secondary and College-Level Math Topics with Comic Strips” at the 2013 South Carolina Council of Teachers of Mathematics (SCCTM) Fall Conference held in Greenville in October 2013.

Presented “Math in Comic Strips and Games” to the Math Club in January 2014.

Presented “Mathematics Present, Mathematics Past” at the annual meeting of the South Carolina Council of Teachers of Mathematics (SCCTM) in Greenville in October 2013.

Presented “History and Operation of the Slide Rule” to the Department of Mathematics Math Club in February 2014.

Presented “Quote-and-Prove Rules” at the FMU Science Seminar in Fall 2013.

Presented “The Dynamic Quote-and-Prove Rules: A Swift, Comprehensive, and Inerrant Method for Structuring Informal Proof” at the Southeastern Section of the Mathematical Association of America (MAA-SE) in March 2014 at Tennessee Tech University in Cookeville, TN.

Awarded a REAL grant entitled “Control Engineering” to expose students to robotics and MATLAB.

Conducted a workshop entitled “Using Technology to Teach Middle Grades Students” at the annual SCCTM conference in Greenville, SC, in October 2013.

Conducted a workshop entitled “Using the TI-15 Calculators to Teach Basics Mathematics Concepts” at the 2014 T3 International Conference in Las Vegas in March 2014.