

Self-Study Submission for Approval

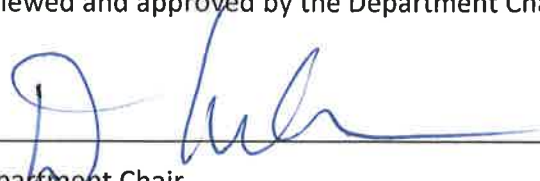
Graduate Program Review

Copies of the graduate program review self-study report should be sent to the University Provost and the Executive Director of Institutional Effectiveness, Planning and Research at least four weeks prior to the reviewer's campus visit. This signature sheet should be attached to each copy of the report.

Major: MATHEMATICAL SCIENCES

Review Year: 2016

The attached Self-Study Report was prepared by the departmental faculty. It has been reviewed and approved by the Department Chair and the Dean of the College.



Department Chair 2/22/16
Date



College Dean 2/22/16
Date

Middle Tennessee State University

DEPARTMENT OF MATHEMATICAL SCIENCES

Graduate Program Review Self-Study

SPRING 2016

MASTER OF SCIENCE IN MATHEMATICS

Graduate Program Policy Committee

Dr. James Hart, Chair

Dr. Don Hong

Dr. Mary Martin

Dr. Wandi Ding

Danielle Baghernejad (Student Representative)

Dr. Donald Nelson, Department Chair

Date

Dr. Bud Fischer, Dean College of Basic and Applied Sciences

Date

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SELF STUDY PART 6 --- Sample Comprehensive Exams

SELF STUDY PART 7 --- Student Registration History

1. The first part of the document is a list of the names of the members of the committee who have been appointed to study the problem of the shortage of housing in the city of New York.

2. The second part of the document is a list of the names of the members of the committee who have been appointed to study the problem of the shortage of housing in the city of New York.

MS PROGRAM REVIEW
MATHEMATICAL SCIENCES
February 2016

INTRODUCTION

Department History

The Department of Mathematical Sciences is composed of thirty-two tenured/tenure-track faculty, all but one of whom holds a doctorate in either mathematics or mathematics education. In addition, the faculty currently includes several adjunct faculty and seven full-time temporary faculty. The Department has three full-time secretaries and eleven graduate teaching assistants. The Department also hosts approximately ten M.S. students who are either self-supporting or receiving support from outside sources.

The Mathematics Graduate Program at MTSU began fifty years ago with a National Science Foundation summer institute that was designed to enhance high school teachers' effectiveness in teaching science and mathematics. In-service teachers sought graduate credit for participation in the institute, and this sowed the seeds of what would become the MS and MST programs in the Department. Tennessee Board of Regents guidelines have historically prevented the Department from developing a PhD program in mathematics. There are however, two interdisciplinary doctoral programs which engage the Department's faculty and students. These are Mathematics and Science Education (MSE) and Computational Science (COMS), both in their sixth year. These are programs unique in the state of Tennessee.

Currently the Department offers graduate and undergraduate courses designed to prepare students to pursue further study in graduate or professional schools, to teach in Grades K-12, and to enter professional careers in arenas that require mathematics. The Department also offers courses specifically designed to help students meet the university's general studies requirements.

Undergraduate programs in the Department lead to the Bachelor of Science Degree with a major in mathematics. Concentrations in Actuarial Science, Professional Mathematics, and Mathematics Education are available for students pursuing this degree. Students seeking licensure in Secondary Education must complete a minor in Secondary Education.

The Department offers graduate courses that lead to a Master of Science (MS) degree in mathematics or to a Master of Science in Teaching (MST) with a major in mathematics. The MS program offers three concentrations—General Mathematics, Research Preparation, and Industrial Mathematics. These concentrations will be discussed in detail in Section III. The Department also offers graduate courses in support of the MSE, COMS, Master of Science in Professional Science (MSPS), and other MS programs across campus.

As the result of a national search, Dr. Donald Nelson assumed the role of Department Chair in fall 2009, replacing Dr. Terrance Quinn. Dr. James Hart was

appointed Program Coordinator for the MS program in Fall 2010. Dr. Rebecca Calahan was appointed GTA coordinator in Fall 2000.

Current Program

Admission to the MS program requires a GRE combined score of at least 291 and an undergraduate GPA of at least 2.75. Applicants are expected to have completed at least twenty-one undergraduate credit hours in mathematics, including the equivalent of Calculus I – III and at least nine credit hours in mathematics courses beyond calculus. Applicants may be admitted with mathematics deficiencies, but such students must make up for these deficiencies during the first year of study. International students must also demonstrate competency in English, either by scoring at least 71 on the TOEFL, or scoring at least 6.0 on the IELTS exams.

A maximum of twelve credit hours may be transferred toward the Masters' Degree; and these hours must come from an accredited institution. All transfer credit must carry a grade of "B" or better.

The Department does not currently offer any courses for the MS degree via correspondence or online media. There are no plans to engage these formats in the near future.

The MS program in mathematics serves other populations besides students pursuing a traditional Master's Degree in mathematics. In particular, the College of Basic and Applied Sciences (CBAS) offers the Master of Science in Professional Science (MSPS). As stipulated by the Sloan Foundation, the MSPS is a two-year terminal degree program that prepares students for non-academic employment. The degree requires a combination of graduate-level business and science courses and is designed to produce graduates both scientifically competent and able to assume administrative roles in technically-oriented industries. Approved emphases in the MSPS program include actuarial science and biostatistics, and it is via these emphases that the MSPS program intersects the MS program in mathematics. Students pursuing these emphases help bolster enrollment in graduate actuarial science, statistics, and biostatistics classes, but do not contribute to the number of MS graduates from the Department.

The PhD in Computational Science (COMS) is a research-intensive interdisciplinary program in the College of Basic and Applied Sciences that incorporates faculty from all areas of specialty housed in the College. The goal of the program is to equip students with a mastery of computational methods, knowledge of computing technology, communication skills, and a firm understanding of the fundamental science underlying at least one discipline in the College. Students enrolled in the program must take a number of math content courses designed and taught by faculty in the math Department. As part of the program, students may obtain an MS degree from the Department and therefore contribute to the Department graduation rate as well as bolstering enrollment in some graduate math classes. It should be noted, however, that most of the math content classes taken by COMS students are 7000-level and therefore are not part of the MS program. (See Graduate Catalog for details; also see Appendix 3 in this document.)

The PhD in Mathematics and Science Education (MSE) is an interdisciplinary program that requires students to develop substantial content knowledge in mathematics or science, demonstrate understanding of educational theory, research

methods, and practices, and conduct discipline-based educational research. Students entering the MSE PhD program are expected either to hold an MS degree in mathematics or science prior to admission, or to obtain one during study. For the most part, MSE students do not contribute significantly to graduate mathematics course enrollment in the Department, nor do they contribute significantly to the number of MS graduates.

1. LEARNING OUTCOMES

1.1 Program and Student Learning Outcomes Are Clearly Identified and Measurable.

Program and Student Learning Outcomes have always been part of the Department's strategic plan. Under the new leadership of Dean Bud Fischer, the College of Basic and Applied Sciences (CBAS) embarked on an extensive review and revision of its Five Year Plan. In response to this, the Department of Mathematical Sciences did the same, thereby ensuring its strategic plan remains in line with the new CBAS plan. The complete Five Year Strategic Plan for the Department may be found in Appendix 2 of this self-study; however, here is an excerpt relevant to the current topic.

VISION

The Department of Mathematical Sciences at Middle Tennessee State University is a community that is striving to share the beauty and power of mathematics and to be nationally and internationally esteemed for excellent teaching, research, and service in the mathematical sciences.

MISSION

The Department of Mathematical Sciences at Middle Tennessee State University works together to:

- provide students with a high quality mathematics education,
- conduct research, and
- share our expertise to the campus and community.

Goals of the MS Program

There are two overriding goals of the MS program in the Department of Mathematical Sciences. In particular, the goals of the MS program are to enable students completing the program to

2. Demonstrate knowledge in the mathematical sciences. Successful candidates should
 - a. Demonstrate knowledge of the various fields of mathematics.
 - b. Describe the historical and cultural significance of mathematics.
 - c. Identify different aspects of the philosophy and nature of mathematics.
 - d. Demonstrate the interrelationship between the branches of mathematics.
 - e. Appreciate the relationship between mathematics and the workplace.
 - f. Understand the relationship between mathematics and other disciplines.
 - g. Use or create mathematical models to solve complex problems.
3. Assume a position of effective leadership. Successful candidates should
 - a. Evaluate and improve personal professional competencies.
 - b. Remain aware of and take advantage of opportunities for professional growth.

- c. Join and contribute to professional groups and societies relevant to mathematics.

The MS program in mathematics seeks to accomplish its mission and goals primarily through course work and focused study. The requirements of the MS in mathematics are published in the MTSU online Graduate Catalog and continually subject to review.

Program requirements are specifically designed to insure that students obtain a solid foundation traditional mathematics and also to allow students the freedom to explore and follow individual interests. This is accomplished by requiring all students to take three core courses—MATH 6120 (Advanced Linear Algebra), MATH 6170 (Sets and Logic), and MATH 6190 (Analysis I)—eighteen credit hours of specified course work, and along with nine credit-hours of supporting course work. Every candidate for the MS degree must declare a concentration in General Mathematics, Industrial Mathematics, or Research Preparation. The specified course work and cognate vary for each concentration. Students have the option of writing a thesis which counts as six credit hours.

1.2 The program uses appropriate evidence to evaluate achievement of program and student learning outcomes.

Measurement of learning outcomes is twofold. First, the courses maintained by the Department are designed to support learning outcomes; and therefore, student success is measured incrementally in each course. The means by which this measuring occurs varies by course and is best understood by examining course syllabi. Consequently, syllabi for most graduate courses taught by the Department are provided in Part 5 of this study.

Second, student learning outcomes are measured based on student success on the Comprehensive Examination covering the three required core courses. Students take this exam on a single day during the semester of graduation. Sample Comprehensive Exams can be found in Part 6 of this self-study.

The Department's Institutional Effectiveness Plan assesses all programs. The MS program goals are expressed specifically in terms of student learning outcomes which are directly related to the three core courses.

1. A graduate with a Master of Science in Mathematics will be able to use the concepts of real analysis to solve problems and prove theorems.
2. A graduate with a Master of Science in Mathematics will be able to use appropriate linear algebra tools and notation to prove fundamental theorems as well as to use them in the context of applications.
3. A graduate with a Master of Science in Mathematics will be able to discover and articulate a proof of a non-trivial theorem.

1.3 The program makes use of information from its evaluation of program and student learning outcomes and uses the results for continuous improvement.

The Department's annual Institutional Effectiveness Achievement Report is discussed by that entire faculty at a Department meeting early in the fall.

In addition to the annual Institutional Effectiveness Achievement Report, the MS program undergoes regular external review. The previous external review was in 2009, conducted by Dr. Harvey Diamond of West Virginia University. The following detail his findings and summarize the Department's responses. Dr. Diamond's complete review may be found in Part 2 of this self-study.

(1) Dr. Diamond's Comment

The GTA stipend is very low, enough to be a deciding factor in whether a student enrolls in the MS program. ... The MS program has been chronically underfunded for a University the size of MTSU that has plans for enhancing research. ... It seems clear that, working with the University's financial resources, a plan should be developed to fund more GTA's and improve the stipends, primarily through the teaching by GTA's of service courses... Anticipating natural attrition among part-time faculty as they move or seek better opportunities elsewhere, GTA's could gradually assume some of the course load currently filled by adjuncts, and as teaching tenure track faculty retire or otherwise leave the university, their salaries could be used to support GTA teaching, with significant cost saving. ... It would greatly benefit the Department to fund a minimum of 15 GTA's at a stipend of about \$8500.

DEPARTMENT RESPONSE:

The Department certainly does not dispute the need for higher GTA stipends and increased GTA lines; indeed, this has been one of the foremost agenda items in meetings between Department representatives and the administration for many years. The number of GTA lines has remained fixed at eleven. These lines are filled every year, and the Department chair on occasion resorts to splitting lines in order to increase the number of students to whom he can offer partial support. The Dean of Basic and Applied Sciences as well as the Dean of the Graduate School are sympathetic to this issue, but have found the upper administration less than enthusiastic about increasing GTA funding or GTA lines.

(2) Dr. Diamond's Comment

The number of tenure-track faculty is relatively large ... [but] the number of funded GTA's is rather small. ... At other institutions, one increasingly finds much of the teaching load has been assumed by non-tenure track faculty or graduate students. A relatively large undergraduate student body, and correspondingly large elementary service course load, has traditionally been an opportunity to support graduate teaching assistants. ... Undergraduate classes offered by the Department are relatively small ... with the staffing of a very large number of sections. Again, the trend elsewhere is sections of increasingly large size, with support provided by graduate teaching assistants. ... the trends described above at other institutions provide the best way, working within constrained financial resources, to support a graduate program, as well as faculty research through release time.

DEPARTMENT RESPONSE:

The Department utilizes GTAs assigned from three interdisciplinary programs housed in the College, MSE, COMS, and MSPS. When these students achieve the required eighteen hours of graduate-level math content courses they are utilized in the

classroom. The Department also makes use of adjunct instructors, most heavily in the fall semesters. Together with the Full-time Temporary Instructors, these GTAs and adjuncts teach virtually all of the general education courses below the level of Calculus I. The Department simply cannot afford to “spend” tenured and tenure-track faculty to teach general education courses. Their expertise is required in higher-level courses.

(3) Dr. Diamond’s Comment

Recruiting good students is always an issue. ... A few observations on attracting students might be the following:

- 1) *The Research I universities will siphon off most of the obvious talent from the region, but there is always the occasional excellent student who, for one reason or another, will find their way to your program. Such students will find your program a reasonable choice.*
- 2) *It is important to provide a solid, consistent alternative for potential students. An extremely low stipend and an extremely small program will discourage students. A stipend high enough to remove that factor as a deciding issue, and a program large enough to offer a basic set of courses and some electives, will put you in the running for good students.*
- 3) *What is the identity of the program? It could be, e.g., “If you are from a small school, or if you did not get a chance to develop your full potential mathematically, this is where you can receive a solid base of mathematics, experience research with a faculty mentor, establish your talent, and get prepared for a good PhD program.” Your identity might emphasize employment opportunities arising from some subset of actuarial science / statistics / computation / modeling / teaching. The Department has the expertise to make such a program work, provided the right vehicles are identified.*
- 4) *There are good students around, some of whom can do well in graduate school. They are used to getting A’s, but they may be from smaller, less competitive programs where they have not been pushed, or where their course options may have been limited. They could use the opportunity to go to the next level that you are providing, although it is difficult to identify those with the greatest potential and some patience is needed while they get acclimated to graduate mathematics.*
- 5) *International students provide a source of well-trained, talented students who will make good use of their graduate training. They can help raise the standards of the domestic students and enliven the mathematical atmosphere of the program.*
- 6) *One is a more enthusiastic and effective recruiter when one is confident in the value and quality of one’s program.*

DEPARTMENT RESPONSE:

Taken together, these suggestions and comments read

“Understand and believe in your program—its strengths, unique features, and the student populations that it would best serve—and reach out to those students.”

This is excellent advice, and important steps have been taken to address this since 2009. Here are some examples.

1. The Department now houses signature graduate programs in actuarial science and mathematical biology. Some students in this program have received job offers before graduating, and several students have gone on to PhD programs.
2. Two students currently have internships in actuarial science, and a course specifically geared toward actuarial science internships is in the early stages of development.
3. The Department hosts ongoing colloquia in discrete mathematics and mathematical biology, and both meeting frequency and attendance have increased since 2009. Faculty from Vanderbilt routinely attend these colloquia, and graduate students get the chance to hear about cutting edge research from MTSU faculty, Vanderbilt faculty, and visiting faculty from a host of institutions.
4. Dr. Don Hong frequently recruits students from China. To date, at least ten Chinese students have taken graduate or undergraduate courses from the Department, especially in actuarial science.
5. Since 2011, efforts have been made to admit more Arabic women to the MS program. Many of these women want to come to the US because their husbands have entered graduate programs in this country; but due to cultural circumstances in their homeland, they have not received the exposure to English necessary to earn the required minimum score on the GRE examination. With the approval of the Graduate College, the Department has waived the GRE requirement for those students whose undergraduate GPA is sufficiently high and whose mathematics coursework is sufficiently broad to suggest they could succeed in the program. To date, this strategy has proven successful, with several Arabic women admitted in this way obtaining an MS degree from the Department and several more making excellent progress toward the degree.
6. The Department has formulated a five-year Strategic Plan that provides concise Mission, Vision, and Core Values statements that encompass all programs. (This plan is provided in Appendix 2 below.)

In general it is not the quality of our MS students which is of concern, but rather the number. As mentioned above, we have benefited by an increased number of international students who often come with full support, especially from China and Saudi Arabia.

There is much that could still be done, however. For example, the Department has not actively recruited from the many small area colleges and does not have readily available flyers that could be mailed to Departments. It should be noted, however, that the Department currently has no difficulty filling GTA positions; and without competitive stipends or additional lines, it is difficult to feel overly positive about recruitment.

(4) Dr. Diamond's Comment

Given the relative proximity of Nashville, are there any opportunities that could be developed, such as revenue-producing courses or programs, internships for graduate students, cooperative ventures with other colleges, such as Vanderbilt? Even a weekly road trip to attend a colloquium might add to the student's experience in the program and provide visibility to the program.

DEPARTMENT RESPONSE:

University policy and TBR guidelines make development of revenue-producing programs problematic. As mentioned in the previous response, some students are taking advantage of internship opportunities, and the actuarial science program in particular is planning a course whose goal will be to increase the number of students doing so.

(5) Dr. Diamond's Comment

The PhD in Computational Science could work to strengthen the MS program and the MS degree. Beyond providing increased enrollment in relevant mathematics courses, it would be helpful to provide a path either to, or through, the program that includes an MS in Mathematics. ... Mathematics course offerings under the PhD program should be coordinated with those of the MS so that there are not, for example, two or three different flavors of numerical methods/scientific computation competing for the same students.

DEPARTMENT RESPONSE:

The COMS program started accepting students in fall 2010. Since then, the Department has implemented a graduate minor and an MS degree tailored to students in this program. The COMS minor and MS degree requirements are included in Appendix 3.

(6) Dr. Diamond's Comment

The Department has enormous potential for putting together an MS program that provides real employment opportunities for students, and thereby stands out among its peers. ... While I will not venture to make detailed suggestions here, the Department may want to look as an example at the longstanding Clemson MS program in mathematical sciences, which has just this goal.

DEPARTMENT RESPONSE:

Our MS graduates fare well after leaving us. Alumni of our MS program often continue their education in doctoral programs. We currently have MS graduates enrolled at the University of South Carolina, the University of Tennessee, the University of Memphis, Florida State University, the University of California Santa Barbara, and MTSU.

Over the years, graduates from our MS program have been hired by SIGMA Actuarial Consulting, Sarah Cannon Research Institute, Bryan, Pendleton, Swats & McAllister (actuarial consulting firm, the Capital Market Company, Volunteer State Community College, Motlow State Community College, Roan State Community College, Pellissippi State Community College, Nashville State Community College, Columbia State Community College, Cleveland State Community College, Walters State Community College, Tennessee Technological Institute, Cumberland University, Austin Peay University, Western Kentucky University, and Middle Tennessee State University. Placement of recent graduates is detailed in section 6.3.

1.4 The program directly aligns with the institution's mission.

The Department maintains a written Mission Statement and a list of Program Goals which are regularly reviewed by the Graduate Program Policy Committee. Also we have completed a five-year Strategic Plan which was submitted and approved by the Dean of the College of Basic and Applied Sciences. A complete copy of the Five-Year

Plan is included as Appendix 2 in this self-study.

2. Curriculum

2.1 The curriculum content and organization is reviewed regularly and the results are used for curricular improvement.

The University, College and Department have a successful system of governance and maintenance of programs and curricula. The Graduate Council and College of Graduate Studies oversee the planning and implementation of all university graduate programs.

At the Department level, faculty are assigned to Curriculum Groups based on current teaching and research interests. These groups encourage discussion and exploration of curriculum issues. Such concerns are formally addressed via standing committees in the Department; final recommendations for policy or curriculum change is made to the faculty through the Undergraduate Program Policy (UPPC) or the Graduate Program Policy Committee (GPPC). Program and course changes approved by the Department are then forwarded to the College Curriculum Committee and then to the Graduate Council. As appropriate, some recommendations are then sent forward to the Tennessee Board of Regents (TBR) for approval.

This governance structure allows every faculty member the opportunity to participate fully in curriculum development, policy making, institutional planning, and governance. Currently we have seven standing committees within the Department. The Chair assigns full-time faculty to these committees, and service on these committees is typically for at least one year. Selection of faculty for service on these committees is made to assure representation each Curriculum Group. The Department's standing committees are:

1. Graduate Program Policy Committee—responsible for general academic policy and procedural matters related to graduate courses and programs;
2. Undergraduate Program Policy Committee—responsible for general academic policy and procedural matters related to undergraduate courses and programs;
3. General Education Committee—responsible for monitoring all aspects of College Algebra (Math 1710), Trigonometry (Math 1720), Math for General Studies (Math 1010), and Applied Statistics (Math 1530)
4. Calculus / Precalculus Committee—responsible for monitoring all aspects of the calculus sequence and its related courses
5. Research and Scholarship Committee—responsible for the promotion of research and scholarly activities, reviewing faculty requests for guest speakers.
6. Teaching Advancement Committee—responsible for developing ways that faculty can support each other as new pedagogies and content are explored;
7. Strategic Planning Committee—responsible for making recommendations to Chair for hiring new faculty, and Department wide issues.

2.2 The program has developed a process to ensure courses are offered regularly and that students can make timely progress towards their degree.

Each semester, students are able to register for a variety of classes that allow them to progress toward the degree. Students may also register for independent study and special problems classes to progress toward their degree and to explore topics not addressed in existing courses. Part 7 of this self-study provides the registration history for all MS students enrolled for spring 2016.

The Department maintains sufficient academic diversity in its faculty to ensure that all courses offered can be taught. The following table lists graduate courses along with the graduate faculty most qualified to teach them.

Core

MATH 6120—Advanced Linear Algebra..... Hart, Martin, Zha, Ding, Quinn
MATH 6170—Sets and Logic..... Hart, Martin, Zha, Leander
MATH 6190—Analysis I..... Leander, Melnikov, Sinkala, Ding, Quinn

Actuarial and Finance Mathematics

ACSI 5200 ---- Intro to Math of Investment Hong, Wu, Khaliq
ACSI 5330 ---- Actuarial Mathematics I..... Hong, Wu, Khaliq
ACSI 5340 ---- Actuarial and Finance Mathematics..... Hong, Wu, Khaliq
ACSI 5200 ---- Intro to Math of Investment..... Hong, Wu, Khaliq
ACSI 5330 ---- Actuarial Mathematics I..... Hong, Wu, Khaliq
ACSI 5340 ---- Actuarial Mathematics II..... Hong, Wu, Khaliq
ACSI 5630 ---- Math of Risk Management..... Hong, Wu, Khaliq
ACSI 5640 ----Math of Options, Futures, and Other Derivatives..... Hong, Wu, Khaliq
ACSI 6010 ---- Credibility Theory and Loss Distributions
MATH 6603—Mathematics of Finance..... Hong, Wu, Khaliq
MATH 6604—Mathematics of Life Contingencies..... Hong, Wu, Khaliq

Algebra and Number Theory

MATH 5420—Number Theory Stephens, Hart, Sinkala
MATH 5530—Abstract Algebra II..... Hart, Martin
MATH 6140 ---Selected Topics in Algebra..... Hart, Martin
MATH 6510—Advanced Algebra..... Hart, Martin

Analysis / Graph Theory

MATH 6141 ---Selected Topics in Analysis..... Leander, Melnikov, Sinkala, Ding, Quinn
MATH 6200--- Analysis II..... Leander, Melnikov, Sinkala, Ding, Quinn
MATH 6210--- Complex Variables Leander, Melnikov, Sinkala, Ding, Quinn
MATH 6250--- Real Analysis Leander, Melnikov, Sinkala, Ding, Quinn
MATH 5700—Combinatorics/Graph Theory..... Stephens, Zha, Ye
MATH 6700—Adv. Combinatorics/Graph Theory..... Stephens, Zha, Ye

Geometry and Topology

MATH 5270—Introduction to Topology..... Stephens, Hart, Martin, Zha
MATH 6400—Advanced Geometry..... Melnikov, Stephens
MATH 6142 ---Selected Topics in Topology..... Stephens, Hart, Martin, Zha

Industrial Mathematics

MATH 5310--- Numerical Analysis I Leander, Melnikov, Sinkala, Ding, Quinn
MATH 5320—Numerical Analysis II Leander, Melnikov, Sinkala, Ding, Quinn
MATH 6260--- Advanced Differential Equations I Leander, Melnikov, Sinkala, Ding, Quinn

MATH 6270—Advanced Differential Equations II..... Leander, Melnikov,
Sinkala, Ding, Quinn
MATH 6300--- Optimization..... Leander, Melnikov, Sinkala, Ding, Quinn
MATH 6310—Control Theory..... Leander, Melnikov, Sinkala, Ding, Quinn

Statistics

STAT 5200 ---- Statistical Methods for Forecasting..... Green, Rowell, Walsh,
Zhang
STAT 5320 ----Probability and Stochastic Processes..... Green, Rowell, Walsh,
Zhang
STAT 5360 ----Regression Analysis..... Green, Rowell, Walsh, Zhang
STAT 5370 ---- Nonparametric Statistics Green, Rowell, Walsh, Zhang
STAT 5380 ---- Experimental Design Green, Rowell, Walsh, Zhang
STAT 6160 ----Statistics..... Green, Rowell, Walsh, Zhang
STAT 6180 ----Statistical Inference Green, Rowell, Walsh, Zhang
STAT 6602 ----Regression Analysis Green, Rowell, Walsh, Zhang
STAT 6603 ---- Nonparametric Statistics Green, Rowell, Walsh, Zhang
STAT 6604 ---- Combinatorics/Graph Theory Experimental Design..... Green,
Rowell, Walsh, Zhang

The Department maintains a two-year course rotation that is published on the Department webpage. The rotation is updated by the GPPC every two years. In order to meet minimum enrollment, courses are usually offered every other year. There are graduate-level courses not on the rotation, which are offered on demand. Students and faculty both recruit for these courses.

Department of Mathematical Sciences
 Graduate Course Offerings Summer 2015 – Spring 2017
 (Subject to enrollment)

Master of Science (MS)

	15U	15F	16S	16U	16F	17S
MATHEMATICS						
Introduction to Topology					5270	
Number Theory						5420
Abstract Algebra I		5510			5510	
History & Phil of Math		5620			5620	
Advanced Linear Algebra			6120			6120
Selected Topics: Algebra						6140
Selected Topics: Topology		6142				
Sets and Logic		6170			6170	
Analysis I			6190			6190
Adv Diff Equations I					6260	
Optimization			6300			
Math of Finance (Contact department for info)		6603			6603	
Math of Life Contingencies (Contact department for info)			6604			6604
Probs in Math: Num Analysis					6605	
Adv Comb & Graph Theory		6700				
STATISTICS						
Prob & Stat Reasoning		5140	5140		5140	5140
Math Statistics II			5190			5190
Stat Methods for Forecast		5200			5200	
Prob & Stochastic Process			5320			5320
Intro to Biostatistics		6020			6020	
Advanced Math Statistics I		6160			6160	
Advanced Math Statistics II			6180			6180
Biostatistical Methods		6510			6510	
Advanced Biostat Methods			6520			6520
Regression Analysis	6602				6602	
Nonparametric Statistics		6603				6603
Experimental Design			6604			
SAS Programming				6605		
ACTUARIAL SCIENCE						
Math Found of Act Sci			5140			5140
Intro to Math of Investment		5200			5200	
Math of Pricing Theory			5220			5220
Math of Compound Interest		5230			5230	
Math of Int, Theory, Econ			5240			5240
Actuarial Mathematics I			5330			5330
Actuarial Mathematics II		5340			5340	
Math of Risk Management		5630			5630	

Department of Mathematical Sciences
 Graduate Course Offerings Summer 2015 – Spring 2017
 (Subject to enrollment)

Math of Options, Futures			5640		5640
Cred. Thry. and Loss Distr.		6010		6010	
Construction and Evaluation of Actuarial Models			6020		6020
Actuarial Models for Life Contingencies		6030		6030	
Actuarial Models for Financial Economics			6040		6040

2.3 The program reflects progressively more advanced in academic content than its related undergraduate programs.

All 5000-level courses are dually listed as 4000-level undergraduate courses. Graduate students may count at most four 5000-level courses toward their degree and must do extra work in addition to the requirements placed on undergraduates. The extra work typically falls into one or more of the following categories:

- Completing proof-based take-home exams in addition to in-class exams
- Preparing and presenting content to the class
- Writing a paper that explores an application of some topic covered in class

In recent years, a number of 5000-level courses have been added to the graduate offerings, especially in statistics and actuarial science. These courses are attractive to graduate students pursuing these emphases; hence the four-course limit is becoming an increasing issue. The limit is based on the university requirement that no more than 30% of graduate credit come from 5000-level classes; and as such, cannot be avoided. To deal with this problem, the Department has on a case-by-case basis granted special 6000-level status to individual students enrolled in a 5000-level course. The 6000-level status takes the form of a “special problems” course and must have the approval of the course instructor, Department chair, and graduate coordinator. Students enrolled in these special problems courses are expected to do extra work worthy of 6000-level standing. The details of this extra work depend on the course and must be approved by the graduate coordinator.

Content descriptions for all graduate courses maintained by the Department may be found in the online graduate catalog. Details may also be found by examining the course syllabi found in Part 5 of this self-study.

2.4 The curriculum is aligned with and contributes to mastery of program and student learning outcomes identified in 1.1.

The MS program in mathematics is built around three Concentrations, each of which is designed to move students progressively deeper in mathematics.

The General Mathematics Concentration is designed for students seeking a broad background in mathematics. Students choosing this concentration must complete the core, must complete a nine credit-hour cognate of approved supporting course work, and must select at least one course from three of the following areas:

- *Actuarial and Finance Mathematics*
- *Algebra and Number Theory*

- *Analysis / Graph Theory*
- *Geometry and Topology*
- *Industrial Mathematics*
- *Statistics*

A list of courses offered in each area, along with faculty qualified to teach them, can be found in Section 2.2 above.

Students interested in pursuing careers in actuarial science or statistics choose the General Mathematics concentration and emphasize course work in these areas. Actuarial science or statistics courses will make up the bulk of the cognate for these students.

The Industrial Mathematics Concentration is designed for students desiring to work in applied mathematics. Students choosing this concentration must complete the core. Students must complete two semesters each of numerical analysis and differential equations along with either two courses in statistics or two courses in approved applied mathematics courses. Students in this concentration are required to write a masters' thesis, and the credit hours for thesis research partially fulfill the nine-credit hour cognate. Remaining credit hours in the cognate come from approved course work in applied mathematics. A list of approved courses for this concentration may be found in the online graduate catalog.

The Research Preparation Concentration is designed for students desiring a PhD in mathematics. Students choosing this concentration must complete the core. In addition, these students must take topology, complex variables, combinatorics and graph theory, and the second semester of both abstract algebra and analysis. Students enrolled in this concentration must write a masters' thesis, and the credit hours for thesis research partially fulfill the nine-credit hour cognate. The remaining credit hours in the cognate come from approved course work in mathematics.

Candidates completing the MS degree in mathematics must

- complete a Degree Plan during their first semester and adjust this plan as needed;
- complete thirty-six hours of course work, at least thirty of which must be graduate level, and at least twenty-one of which must be at the 6000 level;
- file a Candidacy Form with the Graduate Office prior to completing twenty-one credit hours of course work;
- pass a series of written comprehensive exams over the core courses, and for those not writing a thesis, comprehensive exams over two additional courses of their choice.

Candidates must pass all comprehensive exams; only two chances are given to pass exams. Candidates writing a thesis must also provide a public defense of their thesis prior to submitting the thesis to the College of Graduate Studies. Candidates awarded a graduate teaching assistantship (GTA) must participate in an ongoing Graduate Seminar and must give an oral presentation on an approved topic as part of this seminar.

The curriculum is not static. Each individual course is subject to continuous adjustment, within the content of the course, by individual instructors in order to better meet the needs of students. Discussion of the Department's annual Institutional Achievement Effectiveness Report gives opportunity for assessment of the curriculum

from a more holistic standpoint. In addition, and perhaps most important of all, the faculty follow our graduates as they further their study in doctoral programs or seek employment which utilizes their knowledge and skill.

2.5 The curriculum is structured to include knowledge of the literature of the discipline.

Courses offered by the Department are designed to address principal aspects of mathematical inquiry. The core courses required of all students are designed to begin the process of self-study in mathematics. Knowledge of the literature develops as students advance through the coursework; in particular, knowledge of the literature becomes a key component of the thesis option.

Necessity dictates that most mathematical research at the Masters' level be expository. However, a number of students have developed original results as part of their thesis experience or other project. In recent years, this has been especially true for students studying actuarial science, graph theory, and algebra. (See response to Rubric Topic 2.6 for details.)

Regardless of the nature of the research experience, the student gains knowledge and practice with the research process and function of mathematics, developing an understanding of the subject matter, literature, theory, and processes involved in mathematical research. The development occurs in routine coursework as well as in the thesis experience. Again, the reader is directed to Part 5 of this self-study for more information regarding how these aspects are incorporated into coursework.

2.6 The curriculum strives to offer ongoing student engagement in research and/or appropriate professional practice and training experiences.

Students in the MS program have various research opportunities. In recent years, an increasing number of MS students have opted for the Research Preparation concentration and have written a masters' thesis.

Students who have completed a masters' thesis since 2010 include the following.

1. Frazier, Brian. Lattice Structures in Finite Graph Topologies, 2015
2. Bachstein, Anna Caroline. Decomposition of Cubic Graphs on the Torus and Klein Bottle, 2015
3. Ramsay, Daniel. Minor-monotonicity of the Colin de Verdière number of a graph, 2015.
4. Whitlatch, Hays Wimsatt. Isoperimetric constants in planar graphs with hyperbolic properties, 2014.
5. Ye, Ye Zoe. Tail Conditional Expectations for Extended Exponential Dispersion Models, 2014.
6. Sager, Milton W., III. In-wheel hub SRM simulation and analysis, 2014.
7. Yin, Le. Medical trend analysis methods, 2014.
8. Pair, Jeffrey. The minimum value of the Randic index for graphs with a base and a given number of pendant vertices, 2012.
9. Boateng, Nana Akwasi Abayie. Meshfree methods for the black-scholes partial differential equation, 2012.

10. Dalrymple, Jay Alexander. A partial information system representation of partial domains, 2012.
11. Ewool, Richard Clifton. Stochastic modeling of chemical reactions: mechaelis-menten type, 2011.
12. Lu, Rong. A nonparametric phenotypic coding of the univariate family-based association test in the late time-to-onset analysis, 2011.
13. Fernando, Wedigo Sandesh Kushantha. Pricing Asian option using PDE and monte carlo approaches, 2011.
14. Manathunga, Vajira Asanka. The non-commuting graph of the alternating group A_{16} , 2011.
15. Kusi-Appiah, Akwasi Opoku. Multigrid method and application to protein folding, 2010.
16. Zhang, Fengqing (Zoe). Multivariate analysis methods for IMS data biomarker selection and classification, 2010.

2.7 Programs offered entirely through distance education technologies are evaluated regularly to assure achievement of program outcomes at least equivalent to on-campus programs.

We have no programs offered entirely through distance education.

2.8 The program incorporates appropriate pedagogical and/or technological innovations that advance student learning into the curriculum.

Pedagogy and technology appropriate to course content is used by all faculty; this is best verified by examining course syllabi. (See Part 5—Course Syllabi.) Pedagogy at the graduate level is geared toward one-on-one interaction between faculty and student, especially in the advanced courses.

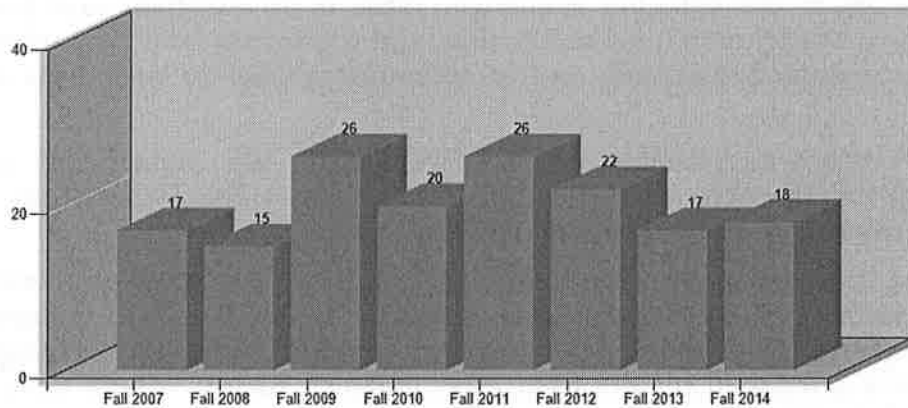
As the list of master's theses in the response to Rubric Topic 2.6 reveals, technology has increasingly become a vital tool in several areas of mathematics research. MS students working with faculty in statistics, actuarial science, mathematical biology, numerical analysis and mathematical modeling make use of sophisticated software to estimate solutions and analyze large data sets.

3. Student Experience

3.1 The program ensures a critical mass of students to ensure an appropriate group of peers.

The data presented below are obtained from university records, through the College of Graduate Studies. On average since fall 2009, the Department has about twenty-one MS graduate students enrolled every semester (full and part-time).

Unduplicated Headcount By Term: GND, MS Degree(s) in the Major of Mathematics



Full-time enrollments have generally followed the number of GTA lines available to the Department. Prior to 2006, the Department had nine GTA lines. Two additional lines were added for fall 2006. No new lines have been added since that time. Achieving the required minimum enrollments has been a decreasing problem as the number of students from COMS, MSPS, and MSE programs taking MS courses has increased.

As noted in Section 1.3, stipends for GTA's, and the number of GTA lines in the Department, are determined by the administration. Currently a GTA receives a stipend of \$6900, paid over the fall and spring semesters, plus tuition and part of the fees. They receive no benefits during the summer. It is not unusual for MS GTAs to work in order to supplement their income.

3.2 The program provides students with the opportunities to regularly evaluate the curriculum and faculty relative to the quality of their teaching effectiveness.

The University requires that each class be evaluated by students each semester. In addition, students feel free to express concerns to the Chair, the Graduate Coordinator, and the GTA coordinator.

3.3 The program provides adequate professional development opportunities, such as encouraging membership in professional associations, participation in conferences and workshops, and opportunities for publication.

The Department provides opportunities for student professional development in teaching and scholarly activity.

With regard to professional development in teaching, it is important to note that roughly half of the students enrolled in the MS program serve as Graduate Teaching Assistants (GTA's) in the Department. In order to be allowed to teach in the Department, SACS (Southern Association of Colleges and Schools) requires that every instructor complete at least eighteen credit hours of graduate level mathematics. New GTA's who have not met this requirement serve as tutors in the Mathematics Lab under the supervision of the GTA Coordinator.

With few exceptions, GTA's in the Department teach College Algebra (MATH 1710) or work in the Mathematics Lab. There are typically about thirty sections of College Algebra per semester.

GTA's working in the Mathematics Lab serve students taking the departmental service courses or the calculus sequence. This is an excellent and free service for undergraduate students in need of tutoring, and it provides GTA's valuable experiences wrestling with student thinking and understanding prior to their own tenure in the classroom.

With regard to promoting scholarly activity, the Department maintains an institutional membership with the AMS. This allows the Department to nominate graduate students for Graduate Student Memberships.

Using the Mathematics Enrichment Fund, the Department supports MS student travel to professional conferences and workshops. In fall 2015 groups attended a regional MAA meeting and a conference at the University of Mississippi. Several students have published results from their master's theses; others have collaborated with their advisors.

3.4 The program provides adequate enrichment opportunities, such as lecture series, to promote a scholarly environment.

The Department hosts a number of visiting speakers each year and offers regular colloquia in discrete mathematics and mathematical biology. In addition, MS students are invited to attend regular colloquia and other presentations hosted by COMS and MSE.

3.5 The program seeks to include diverse perspectives and experiences through curricular and extracurricular activities.

In addition to exposure to new perspectives and research through colloquia and guest speakers, students gain such experiences through coursework, especially in actuarial science, statistics and mathematical biology. (See Part 5—Course Syllabi.)

3.6 Students have access to appropriate academic support services.

Every MS student has an assigned faculty advisor who is available for support and direction. All instructors are required to hold office hours each week when they are available to help students. Students, especially those who were undergraduates in our BS program, often feel free to consult faculty with whom they have established a professional and personal relationship. For non-academic issues the University and the College of Graduate Studies maintain counseling and support services for all students. Graduate students in need of advice can contact these services directly, but usually come to the Graduate Coordinator or the GTA coordinator as a first step.

4. Faculty

4.1 All faculty, full time and part-time, meet the high standards set by the program and expected SACSCOC guidelines for credentials.

The University is vigilant in regard to faculty credentials. All instructors are required to submit original transcripts as part of the application process. In addition, no one is allowed to teach a graduate-level course unless they have been admitted to the Graduate Faculty. This requires application, a letter of support from the Chair, and endorsements from Program Coordinators, and Academic Dean. The decision is made by the Graduate Council. Graduate Faculty status requires recent research activity and must be renewed every five years. Criteria required for graduate faculty status, as well as the application process, may be found in Appendix 6 of this self-study.

4.2 The faculty teaching loads are aligned with the highly individualized nature of graduate instruction, especially the direction of theses or dissertations.

With the onset of COMS and MSE doctoral programs, research active faculty were given an “automatic” three-hour release. Beginning this academic year, with support of the Dean, faculty who are also engaged academically with graduate students are granted a second three-hour release. This policy results in two course loads for these faculty. Since our calculus courses and a few COMS courses carry four-hour credit, faculty could be teaching six, seven, or eight hours. Students working on master’s theses enroll in six hours of research credit. Doctoral students enroll for twelve hours of dissertation research. The credit hours generated are credited to the faculty members. Only in rare cases would a faculty member be assigned a three-hour teaching load.

In addition to reduced teaching loads, the University awards select faculty a semester of non-instructional assignment (NIA). These require an application giving details of what is to be accomplished. Last year two mathematics faculty received NIAs. Two additional mathematics faculty have been awarded NIAs for fall 2016.

The following table shows graduate faculty teaching loads since spring 2010. Sections that are blacked out represent times before faculty were hired. These teaching load totals include not only regularly scheduled classes but also thesis and dissertation research hours and other credit bearing activities with individual students.

	S10	F10	S11	F11	S 12	F12	S13	F13	S14	F14	S 15	F 15
Barlow				3	3	3	4	4	3	5	7	5
Barnwal	11	10	10	11	8	11	13	12	12	12	12	15
Blieler						6	7	6	6	6	6	9
Chappell	6	4	6	3	7	9	6	5	5	9	4	7
Ding	7	5	7	7	9	6	9	7	7	6	9	6
Green	8	12	7	LOA	9	8	6	9	9	9	8	9
Hart	11	11	7	11	9	10	10	6	6	7	7	7
Hong	6	8	7	9	6	7	6	6	6	NIA	6	6
Huang				6	6	6	6	7	7	9	7	9
Khaliq	6	8	7	7	7	7	8	8	8	8	NIA	4
Kimmins	4	9	6	9	13	7	13	12	12	10	8	10
Leander								6	6	6	6	9
Lischka								6	6	4	4	6
Martin	6	13	3	9	9	10	7	10	10	11	9	10
Melnikov	7	6	8	8	10	8	8	9	9	8	8	8
Quinn	10	8	9	11	LOA	LOA	12	11	11	12	12	12
Rowell	6	3	3	7	5	6	6	8	8	9	6	8
Sinkala	7	8	7	6	6	7	7	7	7	12	11	10
Stephens	11	9	6	8	8	8	6	6	6	8	7	7
Strayer				6	6	6	6	7	7	7	5	7

Walsh	12	12	11	12	11	11	12	13	13	12	12	
Worsey	8	12	10	12	8	10	9	11	1	12	12	
Wu				6	6	6	6	7	7	9	6	9
Ye						6	6	6	6	7	8	9
Zha	6	6	6	9	6	7	7	8	8	7	7	8
Zhang	12	12	12	12	11	11	12	12	12	12	2	12
AVERAGE	8	8.667	7.333	8.19	7.762	7.652	8	8.038	7.615	8.68	7.56	8.654

4.3* The faculty strives to cultivate diversity with respect to gender, ethnicity, and academic background, as appropriate to the demographics of the discipline.

The University strives for diversity. In the hiring process all applicant pools must be approved by the University's office of Institutional Equity and Compliance. The Department faculty includes sixteen international faculty, fourteen T-TT and two FTTs. They come to us from Canada, China, England, Holland, India, Pakistan, Sudan, Ukraine, and Zambia. One-third of the graduate faculty is female.

4.4 The faculty engages in regular professional development that enhances their teaching, scholarship and practice.

The graduate faculty is remarkably active in research and professional development. The list below shows wide range of research interests:

Actuarial Science

Dr. Qiang Wu, Dr. Abdul Khaliq, Dr. Don Hong

Algebra / Number Theory

Dr. James Hart, Dr. Mary Martin

Analysis

Dr. Yuri Melnikov, Dr. Wandi Ding, Dr. Rachel Leander, Dr. Zachariah Sinkala

Graph Theory / Topology

Dr. Donald Nelson, Dr. Dong Ye, Dr. Xiaoya Zha, Dr. Christopher Stephens

Mathematical Biology

Dr. Zachariah Sinkala, Dr. Terrence Quinn, Dr. Rachel Leander, Dr. Wandi Ding

Mathematics Education

Dr. Michaele Chappell, Dr. Angela Barlow, Dr. Jeremy Strayer, Dr. Sarah Bleiler-Baxter, Dr. Allison Lischka, Dr. Dovie Kimmins, Dr. Rongjin Huang

Statistics and Statistic Education

Dr. Dennis Walsh, Dr. Ginger Rowell, Dr. Ping Zhang, Dr. Nancy McCormick, Dr. Lisa Green, Dr. Qiang Wu, Dr. Don Hong

Foundations

Dr. Terrence Quinn

Stochastic Partial Differential Equations and stochastic systems

Dr. Abdul Khaliq

Integer Sequences

Dr. Dennis Walsh

The faculty in the Department of Mathematical Sciences is consistently one of the most research- and grant-active in the university, and the faculty often involves students in both. According to the Department End-of-Year report for 2014-2015, the most recent year available.

- two faculty serve as Editor-in-Chief for international journals, and seven faculty serve in other capacities on editorial and grant review boards;
- twenty-four faculty along with twenty-three graduate students together generated fifty-seven publications in peer-reviewed journals during that year alone;¹
- at least eighteen faculty were involved in grants totaling \$728,000 in external funding.

A complete listing of conferences and workshops attended, and publications for Academic Year 2014-2015 can be found in Appendix 1—the Department’s End of Year Report. A long-term perspective can be obtained from Part 4 —Faculty Vitae.

4.5 The faculty is actively engaged in planning, evaluation and improvement processes that measure and advance student success.

See Sections 1.2 and 1.3 above.

4.6 The program uses an appropriate process to incorporate the faculty evaluation system to improve teaching, scholarly and creative activities, and service.

Each faculty member is evaluated annually by the Chair. This evaluation includes instruction; research and creative activity; plus service to students, to the University, to the profession, and to the public. The Dean does indeed read and consider these evaluations, discussing concerns with the Chair.

Tenure-Track faculty must undergo an additional formal review annually for renewal. This review includes evaluations by peers on the Department’s Promotion and Tenure Review Committee, the Chair, the College Promotion and Tenure Review Committee, and the Dean.

Led by the Teaching Advancement Committee, the Department has begun discussion of the broader issue of evaluation of teaching effectiveness. This is ongoing. The Teaching Advancement Committee has developed an instrument that allows faculty to provide non-threatening peer-review. (See Appendix 4.) The goal is that all faculty in the Department will work in small peer-review groups of three or four individuals. Members of these groups will use the instrument to review each other’s teaching in a purely formative manner. Through examination and discussion of each other’s teaching, will provide the means for all instructors to experience and experiment with pedagogies and content delivery methods that are novel to them.

5. Learning Resources

5.1 The program regularly evaluates its equipment and facilities, encouraging necessary improvements within the context of overall institutional resources.

¹ Some of these graduate students were enrolled in the MSE or COMS PhD programs.

Faculty and classroom computers and software are the primary concerns about equipment. After a lapse in the regular replacement of faculty computers the administration has announced a plan for periodic replacement beginning this spring. Through its budget and Indirect Fund the Department has been able to provide the resources to obtain needed software.

The Department is housed in the Kirksey Old Main, the oldest building on campus. In some ways the age of the building years of delayed maintenance are obvious. This is particularly true in restrooms, stairwells, and entrances to the building. External issues such as rusted gutters are also evident. However, the classrooms are generally well furnished and equipped. This is especially true of those which are designated as "Master Classrooms." ITD is generally responds quickly to malfunctions in classrooms.

The University has preliminary plans for a new classroom/office building for Mathematics and Computer Science. This capital project sits at the top the University's priority list but has not yet been added to the TBR's priority list.

5.2 The program has access to learning and information resources that are appropriate to support teaching and learning.

Faculty have generally been provided everything that they needed. The University has a modern and up-to-date library. This is addressed in Appendix 5—Library Report

(See also electronic copy of Excel spreadsheet "Copy of Math Titles".)

5.3 The program provides adequate materials and support staff to encourage research and publication.

The Department employs three support staff, two secretaries and an Executive Aide. They provide support for travel requests and reimbursements as well as many other routine tasks. At their request, faculty are provided graders. In general the Department tries to assist faculty in every possible way. Some faculty are also have COMS, MSE or MSPS GTAs assigned to them to assist with research and/or grant activity.

The Department utilizes its Indirect Fund to support faculty who wish to bring in collaborators or to travel to consult with collaborators. The Office of Sponsored Programs and Research provides faculty training and assistance for grant writing.

6. Support

6.1 The program's operating budget is consistent with the needs of the program.

The Department's operating budget is sufficient to supply secretarial help, supplies, and some equipment. The Department is fortunate to be able to supplement the operating budget from our Indirect Fund and Mathematics Enrichment fund. These are used to support travel for both faculty and students and to fund visiting speakers.

6.2 The program has a history of enrollment and/or graduation rates sufficient to sustain high quality and cost-effectiveness.

It is a challenge to maintain enrollment. The University funds eleven assistantships for the MS and MST programs. For these two-year programs, these support 2.75 students per program per year. The TBR deems graduate programs average fewer than five graduates per year to be "low-producing." In 2009 the MS in Mathematics was so

labeled. Since then we have raised the number of graduates sufficiently to be removed from that list. (See Self-Study Section 3.1— Pages 16-17.) This was achieved by awarding almost all the assistantship to MS students, granting MS degrees to COMS students, and by enrolling an increased number of international students coming to us fully supported. The MST program is in jeopardy for low enrollment.

Degree	Ethnicity	2009-2010 Degree Count	2010- 2011 Degree Count	2011- 2012 Degree Count	2012- 2013 Degree Count	2013- 2014 Degree Count	2014- 2015 Degree Count	Total
MS	Asian	3	3	0	4	4	3	17
	Black or African American	1	0	1	2	1	0	5
	Hispanic	0	0	0	1	1	0	2
	White	4	3	5	2	8	3	25
	MS Total	8	6	6	9	14	6	49
	Grand Total	8	6	6	9	14	6	49

6.3 The program is responsive to local, state, regional, and national needs.

Course content is dictated by academic and professional needs.

In AY 2014-15, Over **ten** graduates from actuarial programs in the Department have achieved **fellow** or **associate** memberships from actuarial professional societies such as the Society of Actuaries and the Casualty Actuarial Society. MS graduate from that year are either employed or enrolled in doctoral programs.

The table below shows placement of MS graduates over the two most recent academic years.

			Degree awarded	Year	Placement post degree
1	Ye	Ye	MS	2014-15	Doctoral student in Department of Economics and Finance, MTSU
2	Muidhah	Alharbi	MS	2014-15	
3	Saham	Alzahrani	MS	2014-15	
4	Sara	Nasab	MS	2014-15	Doctoral student at University of California Santa Barbara
5	Brian	Frazier	MS	2014-15	Doctoral student at Mississippi State University

6	Sultan	Aloybi	MS	2014-15	
7	Brittany	Smith	MS	2013-14	MSE student at MTSU
8	Houston	Higgs	MS	2013-14	Nationwide Insurance, Columbus, OH
9	Natasha	Gerstenschlager	MS	2013-14	MSE student at MTSU
10	Jennifer	Williams	MS	2013-14	College Advisor at MTSU
11	David	Bunting	MS	2013-14	Preaching in Minnesota
12	Milton	Sager	MS	2013-14	
13	Xiong	Lu	MS	2013-14	COMS student at MTSU
14	Le	Yin	MS	2013-14	University of Tennessee Knoxville Ph.D. Program
15	Shuzhe	Xu	MS	2013-14	Working in China
16	Menghan	Lin	MS	2013-14	Economics Ph.D. Program at MTSU
17	Brandi	Finchum	MS	2013-14	Mathematics teacher Lebanon HS
18	Lauren	Stephenson	MS	2013-14	Business Analyst for the Community Needs Assessment group with HCA Physician Services, Brentwood

6.4 The program regularly and systematically collects data on graduating students and evaluates placement of graduates.

The Department conducts an optional exit survey on all graduating MS students and reviews placement. (See Appendix 7 “Graduate Exit Survey”) See data in previous section.

6.5 The program's procedures are regularly reviewed to ensure alignment to institutional policies and mission.

The MS program undergoes regular external review and annual assessment for SACS. This is addressed in sections 1.1, 1.2, 1.3, 1.4, 2.1, and 2.2. Faculty reflect on the outcome of these reviews, and take appropriate action to address issues raised by them. In keeping with the meta-goals of the College of Basic and Applied Sciences (CBAS), the Department has drafted a five-year strategic plan that emphasizes student learning outcomes and outlines steps for enhancing and enforcing those outcomes. (See Appendix 2—Five-Year Strategic Plan.) The Department has created a classroom observation protocol based on research from the University of North Carolina and the NCTM Best Practices to use as a tool in creating and supporting a teaching and learning environment where the Best Practices are employed. This protocol is currently being piloted in some service courses and will be expanded to all courses in fall 2016. (See Appendix 4—Observation Protocol.)

APPENDIX 1— End-of-Year Report (July 1, 2014 – June 30, 2015)

Scorecard and quantifiable measures

	2012	2013	2014
Undergraduate Program			
Fall Headcount Majors	252	192	153
SCH *from IEP&R Degree and Enrollment Dashboard	37,003	34,216 (19,457+13,360+,1881)	33,503* (18,859+13,376+1538)
Summer/Fall Spring Degrees Awarded	38	33	24
# students in mentored research	6	11	10
# service learning courses			
# study away courses			
Graduate program			
Fall Headcount	66 35—MS & MST 15—COMS 16+—MSE	58 (25 MS&MST, 13 COMS, 20 MSE*)	81 (14 COMS; 16 MSE 18 MS; 33 MSPS)
SCH *from IEP&R Degree and Enrollment Dashboard	1730	1427 (739+607+81)	1466* (708+639+119)
Summer/Fall/Spring '13 Degrees awarded (masters level)	15	30 (12 MS, 4 MST, 14 MSPS (ASCI or BIOS)	23 (6 MS; 2 MST; 10 MSPS/BIOS; 5 MSPS/ACSC
Degrees awarded (doctoral)		2 (MSE)	3 (2 COMS; 1 MSE)
# graduate students in mentored research	38	40	67 (students working with multiple faculty are counted more than once)
# Full time temporary Faculty	12	10	8
# course sections taught by adjunct faculty	42	13	17
Scholarship/Research			
# Published books or monographs	2	2	0
# Publications in peer reviewed journals or equivalent electronic sites Details in Appendix A, page 4 *double counting local collaborations	43	65	70*
# publications under review	36	45	46
# Other non-peer-reviewed publications	4	4	0
# Conference presentations and published abstracts Details in Appendix B, page 10	98	53	87
% of T-TT faculty who published this year sites Details in Appendix A, page 4	51.5% (17/33)	60% (21/35)	69% (24/35)
# faculty on Editorial Boards/grant review panels Details in Appendix C, page 15	13	9	9 (21 journals)
# faculty serving as journal, manuscript, etc. reviewers (added this year)Details in Appendix D, page 16			16
# professional leadership/service activities (added this year) Details in Appendix E, page 18			34
Funded Research Activity			
# Grant applications submitted (pending or non-funded) with Department faculty as the PI/Co-PI Details in Appendix F, page 21	10	16	22
Total dollars requested (and either unfunded or pending) Details in Appendix F, page 21	\$988,603	\$2,143,424	\$4,099,950
# Grant applications funded with Department faculty as PI/Co-PI Details in Appendix G, page 23	16	15	12

Total dollars awarded Details in Appendix G, page 23	\$3,365,115	\$460,970	\$1,072,418 (New Money)
# faculty submitting (pending or non-funded) grants as PI/Co-PI Details in Appendix F, page 21	13	12	16 (22 proposals)
# faculty who are PI/Co-PI on grant Details in Appendix G, page 23	14	17	14
# of faculty w/salary support from an external grant Details in Appendix H, page 24	11	13	19 (fall + spring)
# of grants with graduate student support	4	4	6

Goal Area 1: Undergraduate Education

What were the Department's major accomplishments for Undergraduate Education last year?

- We are still here!
- We graduated twenty-four students this year, nine less than last year. (Details in Appendix I, page 24)
- The Department's freshman-level seminar for incoming mathematics majors is listed on the fall 2015 schedule.
- The required minor was dropped for Mathematics Majors with concentrations in Professional Mathematics or Actuarial Science.
- The Department proposed that Actuarial Science be converted to a free-standing major. This proposal is awaiting TBR approval.
- The Department was recognized by President McPhee in his State of the University Address in August for efforts to improve student success.
- The Department's General Education Committee continued its work, standardizing course content, grading, and expectations of our general education service courses. This year we utilized common final examinations in MATH 1010, MATH 1530, MATH 1710, and MATH 1730.
- The Department continued to expand the redesign of MATH 1730—Precalculus into more sections. Twelve of twenty-two sections used this pedagogy in the fall and nine of fourteen sections in the spring. A consultant visited during the summer. We plan to bring in another consultant this summer. Six of the remaining seven FTT faculty are being supported to attend a POGIL workshop this summer (using the President's funds).
- The Department's Teaching Advancement Committee has planned four semester-long discussion groups which will focus on different aspects of the teaching-learning process. In order to be successful, this will require participation from all faculty. (Details in Appendix L, page 27)

What are your plans for the coming year as they relate to:

UG curriculum:

- The Department will extend course redesign to all sections of Precalculus.
- The Department will initiate discussions to extend course redesign to Calculus I.
- The Department will consider proposing an undergraduate minor in Applied Statistics.
- The Department will decide exactly how we wish to handle peer evaluation of teaching.

Our plans to achieve designation as an Actuarial Center of Excellence did not succeed this year. Dr. Barnwal was reinstated as an SOA, and Dr. Wu completed his SOA Associate designation and Associate. However the SOA deemed Dr. Wu's designation too late for evaluation this year. We will continue this quest.

UG engagement (facilities/equipment/student experiences):

The Department was able to utilize newly remodeled and refurbished classrooms in the spring, KOM 200 and KOM 204. One of these rooms has been designated as a Precalculus Classroom and the other has been designated for MATH 1410 and 1420.

UG Honors programs/research experiences for UG students:

Three undergraduates working with Dr. Rachel Leander were recognized during Scholars' Week for their research project modeling the spread of the Ebola virus in an African village.

UG student success/Bragging points:

- The Department provided travel support for an undergraduate mathematics major to attend a professional conference.
- Four undergraduates passed the SOA Exam P/1. (Details in Appendix K, page 26)
- Actuarial Science program has grown to nearly 100 students (including BS, MS, and MSPS)

Goal Area 2: Graduate Education

What were the Department's major accomplishments for Graduate education last year?

- We graduated twenty-three masters' students this year (6 MS, 2 MST, and 15 MSPS; details in Appendix J, page 25)
- Three doctoral students graduated under the direction of Mathematics faculty (details in Appendix J, page 25)
- List graduate student awards (e.g., NSF grant, best poster or paper)

What are your plans for the coming year as they relate to:

Graduate curriculum

- We will continue to monitor our curriculum and program requirements. Changing focus of Actuarial Examinations will be reflected accordingly in appropriate courses.
- We will continue to grow the ABM program, primarily with students from China who are interested in Actuarial Science.
- We will consider proposing a graduate minor in Applied Statistics.

Graduate student awards outside the Department

Student recruiting

Dr. Hong has successfully recruited a growing number of Chinese students to study Actuarial Science with us. Four (4) students from North China University of Technology (NCUT) joined MTSU for actuarial science study in August 2014. These students are in a 3+1+1 exchange program between NCUT and MTSU. Students will complete their last two years' study at MTSU and receive a BS degree from NCUT then an MS degree from MTSU. More students are expected from China.

Student Retention exceeded that of the College as a whole.

Concentration	Retained/Graduated		Not Retained		Total
	Count	Percentage	Count	Percentage	
Actuarial Science	34	85.00%	6	15.00%	40
General Mathematics	13	100.00%	0	0.00%	13
Mathematics Education	63	85.10%	11	14.90%	74
Middle Grade Mathematics	0	0.00%	1	100.00%	1
Professional Mathematics	35	76.10%	11	23.90%	46
Research Preparation	2	100.00%	0	0.00%	2
Mathematical Sciences Total	147	83.50%	29	16.50%	176

Bragging points

- Fifteen graduate students in our programs passed twenty-two professional actuarial science exams this year. (Details in Appendix K, page 26)
- The Department provided \$3190 to support the travel of eight graduate students attending professional conferences. These funds came from the Department's Mathematics Enrichment Fund and the Department's Indirect Account.
- All graduates of MSE have found professional employment.

Goal Area 3: Research/Scholarship/Creative Achievement

What were the Department's major accomplishments in research last year?

- Twenty-four of thirty-five T-TT faculty published in peer-reviewed venues this year.
- Faculty published fifty-seven different papers in peer-reviewed venues this year (67 less double counted local collaborations).
- The Department supported six visiting speakers with \$1,547 from our Indirect Fund.

- At least eighteen faculty were actively involved in one or more grants this year. Several were active in multiple grants.
- Eight faculty obtained twenty-three hours of grant funded releases in the fall and eleven faculty obtained thirty-two hours of grant funded releases in the spring.

What are your plans and goals for the coming year as they relate to:

Enhancing productivity and visibility in your discipline

- I will continue to offer every possible means of support to research and grant active faculty.
- Designation by the Society of Actuaries as an Actuarial Center of Excellence will further enhance our growing and successful programs in Actuarial Science.

Bragging points

- The number and quality of peer-reviewed articles is excellent.
- Twenty-four faculty and twenty-three graduate students co-authored peer-reviewed research publications this year.
- Faculty are active and productive in several areas—research, grantsmanship, and mentoring graduate students.
- Faculty were awarded over \$728,000 in external funding this year (new money this AY).
- The first two graduates from COMS came out of our Department this fall.
- One graduate from MSE finished this year with her dissertation directed by Mathematics Faculty.
- Over ten graduates from actuarial programs in the Department have achieved fellow or associate memberships from actuarial professional societies such as the Society of Actuaries and the Casualty Actuarial Society.
- Two Mathematics Faculty serve as Editor-in-Chief of international journals—Dr. Abdul Khaliq, Editor-in-Chief, International Journal of Computer Mathematics and Dr. Don Hong, Editor-in-Chief, Journal of Health & Medical Informatics

Goal 4: Community Outreach and Service

What were the Department's major accomplishments as they relate to the following:

Outreach activities:

- Two hundred eighty-three students from nineteen schools participated in the Mathematics Teacher Association's Mathematics Contest hosted annually by the Department.
- Two hundred ninety-six students from twenty-nine schools participated in the Middle School Mathematics Contest hosted annually by the Department.
- Several faculty participated in the annual Expand Your Horizons project this year.
- Several faculty participated in the annual Camp MARVEL this year.

Development/fund raising

Alumni:

What are your plans for the coming year:

Make significant progress in the improvement of teaching and learning. This fall we will organize three or four faculty discussion groups focused on particular mathematics teaching practices. (Details in Appendix , page 28) Continue to support and encourage faculty to seek additional opportunities for community outreach and service. Faculty will partner with local business leaders regarding potential internship opportunities and in-class visits to share how mathematics is used in their day to day operations.

Mathematical Sciences Faculty Publications 2014-2015

Barlow, Angela

Barlow, A. T., Lischka, A., Willingham, J. C., & Hartland, K. (accepted). Backing up for fractional understanding. *Teaching Children Mathematics*.

Barlow, A. T., Gerstenschlager, N. E., & Harmon, S. E. (in press). Learning from the unknown student. *Teaching Children Mathematics*.

Yopp, D. A., Burroughs, E. A., Barlow, A. T., & Sutton, J. T. (in press). Views of coaching practice expressed by school-based coaches, *Journal of Mathematics and Science: Collaborative Explorations*.

Bleiler, S. K., Baxter, W. A., Stephens, D. C., & Barlow, A. T. (2015). Constructing meaning: Standards for Mathematical Practice. *Teaching Children Mathematics*, 21, 337 – 344

Gaddy, A. K., Harmon, S. E., Barlow, A. T., Milligan, C., & Huang, R. (2014). Implementing the Common Core: Applying shifts to instruction. *Mathematics Teacher*, 108, 109–113.

Yopp, D. A., Barlow, A. T., Sutton, J. T., & Burroughs, E. A. (2014). Using video of coaching practice to focus mathematics coaching programs. *NCSM Journal of Mathematics Education Leadership*, 15(2), 45–55.

Barlow, A. T., Frick, T. M., Barker, H. L., & Phelps, A. (2014). Modeling instruction: The impact of professional development on instructional practices. *Science Educator*, 23(1), 14–26.

Bleiler, Sarah

Strayer, J. F., Hart, J. B., & Bleiler, S. K. (in press). Kick-starting discussions with the flipped classroom. *Mathematics Teacher*.

Strayer, J. F., Hart, J. B., & Bleiler, S. K. (in press). Knowledge of student thinking using the flipped classroom. *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*.

Bleiler, S. K., Ko, Y.-Y., Yee, S. P., & Boyle, J. D. (in press). Communal development and evolution of a course rubric for proof writing. In C. Suurtamm (Ed.), *Annual perspectives in mathematics education: Assessment to enhance learning and teaching*. Reston, VA: National Council of Teachers of Mathematics.

Bleiler, S. K., Baxter, W. A., Stephens, D. C., & Barlow, A. T. (2015). Constructing meaning: Standards for mathematical practice. *Teaching Children Mathematics*, 21(6), 336-344.

Yee, S. P., Boyle, J. D., Ko, Y.-Y., & Bleiler, S. K. (2015). Empowering ownership of proof with communal proof-writing criteria. In M. Che & K. Adolphson (Eds.), *Proceedings for the 42nd Annual Meeting of the Research Council on Mathematics Learning* (pp. 33-41). Las Vegas, NV.

Wandi Ding

Orou G. Gaoue, Jiang Jiang, Wandi Ding, Folashade B. Agosto and Suzanne Lenhart. Optimal harvesting strategies for timber and non-timber forest products in tropical ecosystems, *Theoretical Ecology*, accepted 2015.

Huili Ma, Hui Feng and Wandi Ding. Global asymptotic behavior of positive solutions for exponential form difference equations with three parameters, *Journal of Applied Analysis and Computation*, accepted 2015.

Huili Ma, Hui Feng, Jiaofeng Wang, Wandi Ding. Boundedness and asymptotic behavior of positive solutions for difference equations of exponential form, *Journal of Nonlinear Science and Applications* 8:893-899, 2015.

Wandi Dine, Suzanne Lenhart & Horst Behncke, Discrete Time Optimal Harvesting of Fish Populations with Age Structure, *Letters in Biomathematics*, Vol 1, No 2, 193-207 (December 2014)

Lisa Green

Observations of Implementations of an Active Learning Module in Introductory Statistics. Strayer, J., McCormick, N., Gerstenschlager, N., Green, L., McDaniel, S., & Rowell, G. (2014). In the refereed Proceedings of the 9th International Conference on Teaching Statistics.

James Hart

Fostering Instructor Knowledge of Student Thinking Using the Flipped Classroom. Joint with Jeremy Strayer and Sarah Bleiler; to appear in *Primus*

Kickstarting Discussions with the Flipped Classroom. Joint with Jeremy Strayer and Sarah Bleiler; to appear in *Math Teacher*

Don Hong

Lu Xiong and Don Hong, Multi-Resolution Analysis Method for IMS Proteomic Data Biomarker Selection and Classification *British Journal of Mathematics & Computer Science*, 5(1): 64-80, 2015.

Don Hong, Zhihui Yang and Jiancheng Zou, Hyperspectral Imaging Type Medical Data Processing: Spectral and Spatial Analysis. *J Health Med Informat* 2015, 6: e135, doi: 10.4172/2157-7420.1000e135

Huang, Rongjin

Huang, R., & Han, X. (2015). Developing mathematics teachers' competence through parallel Lesson study. *International Journal for Lesson and Learning Studies*, 4(2), 100-117.

Huang, R., Prince, K., & Schmidt, T. (2014). Exploration of patterns in a Calendar. *Mathematics Teacher*, 108 (5), 337-342.

Huang, R., Li, Y., Kulm, G., & Willson, V. (2014). Relationships between teaching professional rank, course taking, teaching experience and knowledge of algebra for teaching. *Research in Mathematics Education*, 18(2), 129-149.

Huang, R., Miller, D., & Tzur, R. (2015). Mathematics teaching in Chinese classroom: A hybrid-model analysis of opportunities for students' learning. In Fan, L., Wong, N. Y., Cai, J., & Li, S (Eds.), *How Chinese teach mathematics: Perspectives from insiders* (pp. 73-110). Singapore: World Scientific

Huang, R., Ye, L., & Prince, K. (in press). Professional development system and practices of mathematics teachers in Mainland China. In B. Kaur & K. O. Nam (Eds.), *Professional development of mathematics teachers: An Asian Perspective*.

Huang, R., Wu, P., & Liu, Y. (In press). Characteristics of reform-oriented mathematics classroom in China and the US: A case study of parallel lesson study. S. Li & Y. Li (Eds.), *Curriculum, teachers and classrooms: A comparative study on mathematics curricula in China and the US*. Beijing: Beijing Normal University Press.

Khaliq, Abdul

V. Reshniak, A. Q. M. Khaliq, D. A. Voss, and G. Zhang, Split-step methods for multi-channel stiff stochastic, *Applied Numerical Mathematics*, 89, 1-23, 2015

D. Voss and A. Q. M. Khaliq, Split-step Adams-Moulton Milstein methods for systems of stiff stochastic differential equations, *International J. of Computer Mathematics*, 92, 995-1011, 2015

H. Bhatt, and A.Q.M. Khaliq, Locally extrapolated exponential time differencing LOD method for multi-dimensional reaction-diffusion systems, *Journal of Computational and Applied Mathematics*, 285, 256-278, 2015.

X. Liang, A.Q.M. Khaliq, and Y. Xing, Fourth order exponential time differencing method with local discontinuous Galerkin approximation for coupled nonlinear Schrödinger equations, *Communications in Computational Physics*, 17(2), 510-514, 2015.

X. Liang, A.Q.M. Khaliq, and Q. Sheng, Exponential time differencing Crank-Nicolson method with a quartic spline approximation for nonlinear Schrödinger equations, *Applied Mathematics and Computation*, 235, 235-252, 2014

H. Bhatt and A. Q. M. Khaliq, Higher order exponential time differencing scheme for system of nonlinear Schrödinger equations, *Applied Mathematics and Computation*, 228, 271-291, 2014.

J. Mart'in-Vaqueroa, A.Q.M. Khaliq, and B. Kleefeld, Stabilized explicit Runge-Kutta method for multi-asset American options, *Computers and Mathematics with Applications*, 67(6), 1293-1308, 2014.

Kimmins, Dovie

D. Kimmins & Winters J. (2015) Caution: Venn Diagrams Ahead. *Teaching Children Mathematics*, 21(8), 484-493.

Leander, Rachel

R. Leander, S. Lenhart, V. Protopopescu, Optimal control of continuous systems with impulse controls. *Optimal Control Applications and Methods*, (2014) DOI: 10.1002/oca.2128

R. Leander, E. J. Allen, S. P. Garbett, D. R. Tyson. Derivation and Experimental Comparison of Cell-Division Probability Densities, *Journal of Theoretical Biology: Volume 359* (2014), Pages 129-135.

Lischka, Alyson

An Emergent Framework: Views of Mathematical Processes. Sanchez, W. B., Lischka, A. E., Edenfield, K. W. and Gammill, R. (2015). An Emergent Framework: Views of Mathematical Processes. *School Science and Mathematics*, 115, pp. 88-99. doi: 10.1111/ssm.12103

Challenges and Strategies for Assessing Specialized Knowledge for Teaching. Orrill, C. H., Kim, O., Peters, S. A., Lischka, A. E., Jong, C., Sanchez, W. B., Eli, J. A. (in press). Challenges and Strategies for Assessing Specialized Knowledge for Teaching. *Mathematics Teacher Education and Development*.

Backing up and moving forward in fractional understanding. Barlow, A. T., Lischka, A. E., Willingham, J. C., Hartland, K. S. (in press). Backing up and moving forward in fractional understanding. *Teaching Children Mathematics*.

Views of Mathematical Processes: PME Proceedings. Sanchez, W. B. & Lischka, A. E. (2014). Views of Mathematical Processes: A Framework. In S. Oesterle, C. Nicol, P. Liljedahl, & D. Allen (Eds.), *Proceedings of the Joint Meeting of PME 38 and PME-NA 36*, Vol. 6, p 222, Vancouver, Canada.

McCormick, Nancy

Observations of Implementations of an Active Learning Module in Introductory Statistics. Proceedings of the 9th International Conference on Teaching Statistics. (2014) Strayer, J., McCormick, N., Gerstenschlager, N., Green, L., McDaniel, S., & Rowell, G.

Melnikov, Yuri

Paper by Yuri A. Melnikov "To the efficiency of a Green's function modification of the method of functional equations", *Applied & Computational Mathematics*, 3: 3, 2014

Paper by Yu A. Melnikov and V. Reshniak “An efficient meshless approach to 2-D heat conduction problems in regions of irregular shape”, *Applied Problems of Fluid Mechanics and Heat and Mass Transfer*, 2014, Dnipropetrovsk, Ukraine

Paper by Yu. A. Melnikov and V. Reshniak “A semi-analytical approach to Green’s functions for heat equation in irregular regions, *Engineering Analysis with Boundary Elements*, 46, 2014;

Paper by Borodin, V.N. and Melnikov, Yu.A. “Potential fields generated by point sources in thin shells of revolution weakened with apertures”, *Mathematical Methods in the Applied Sciences*, 38, 6, 2015

Miller, Diane.

Huang, R., Miller, D., & Tzur, R. (2015). Mathematics teaching in Chinese classroom: A hybrid-model analysis of opportunities for students’ learning. In Fan, L., Wong, N. Y., Cai, J., & Li, S (Eds.), *How Chinese teach mathematics: Perspectives from insiders* (pp. 73-110). Singapore: World Scientific

Nelson, Donald A.

Using Multidisciplinary Research Experiences to Enhance STEM Learning through Undergraduate, Team-based, Summer Research Projects for At-risk Students.” in the book *Cases on Research-Based Teaching Methods in Science Education* as published this year. Authors: Jennifer Yantz, Brittany D. Smith, Ginger Holmes Rowell, Thomas Cheatham, Donald Nelson, Chris Stephens and Elaine Bouldin Tenpenny.

Quinn, Terrance

Interpreting Lonergan’s 5th Chapter of *Insight*, Space and Time. Chapter in book, *Seeding Global Collaboration*. Vancouver: Axial Publishing. To Appear.

Lonergan’s Core Shift in Method. *Divyadaan: Journal of Philosophy and Education*. To Appear.

Generalized Empirical Method in the Biological Sciences. *Dialogues in Philosophy, Mental and Neuro Sciences*, 2014; 7(1): 31.

Rowell, Ginger

“Using Multidisciplinary Research Experiences to Enhance STEM Learning through Undergraduate, Team-based, Summer Research Projects for At-risk Students.” in the book *Cases on Research-Based Teaching Methods in Science Education* as published this year. Authors: Jennifer Yantz, Brittany D. Smith, Ginger Holmes Rowell, Thomas Cheatham, Donald Nelson, Chris Stephens and Elaine Bouldin Tenpenny.

Observations of Implementations of an Active Learning Module in Introductory Statistics. Proceedings of the 9th International Conference on Teaching Statistics. (2014) Strayer, J., McCormick, N., Gerstenschlager, N., Green, L., McDaniel, S., & Rowell, G.

Sinkala, Zachariah

Analysis on a Mathematical Model for Tumor induced Angiogenesis (Joint Work with Richard Ewool). *Journal of Applied Mathematics and Physics*

Strayer, Jeremy

Strayer, J. F. & Edwards, M.T. (2015). Smarter cookies. *Mathematics Teacher*. 108(8), 608–615.

Elrod, M. & Strayer, J. F. (2015). Using an Observational Rubric to Facilitate Change in Undergraduate Classroom Norms. In C. Suurtamm & A. R. McDuffie (Eds.), *Annual Perspectives in Mathematics Education: Assessment to Enhance Learning and Teaching*. Reston, VA: NCTM, 87-96.

Hanson, B. R., Strayer, J. F., Mangione, K., Brown, J., & Pair, J. *Implementing GAISE recommendations through “doing statistics” tasks.* Proceedings of the 9th International Conference on Teaching Statistics. July, 2014.

http://iase-web.org/icots/9/proceedings/pdfs/ICOTS9_3E3_HANSON.pdf

Observations of Implementations of an Active Learning Module in Introductory Statistics. Proceedings of the 9th International Conference on Teaching Statistics. (2014) Strayer, J., McCormick, N., Gerstenschlager, N., Green, L., McDaniel, S., & Rowell, G.

Fostering Instructor Knowledge of Student Thinking Using the Flipped Classroom. Joint with Jeremy Strayer and Sarah Bleiler; to appear in *Primus*

Kickstarting Discussions with the Flipped Classroom. Joint with Jeremy Strayer and Sarah Bleiler; to appear in *Math Teacher*

Stephens, Chris

Using the FirstSTEP Summer Research Experience as a base, we developed a chapter describing how teams of students who just completed their first year in college can conduct multidisciplinary research in STEM fields. The chapter “Using Multidisciplinary Research Experiences to Enhance STEM Learning through Undergraduate, Team-based, Summer Research Projects for At-risk Students.” in the book *Cases on Research-Based Teaching Methods in Science Education* as published this year. Authors: Jennifer Yantz, Brittany D. Smith, Ginger Holmes Rowell, Thomas Cheatham, Donald Nelson, Chris Stephens and Elaine Bouldin Tenpenny.

Bleiler, Sarah K., Wesley A. Baxter, D. Christopher Stephens, and Angela T. Barlow. Constructing Meaning: Standards for Mathematical Practice. *Teaching Children Mathematics*, Feb. 2015, 336–44.

Tenpenny, Elaine Bouldin.

Using Multidisciplinary Research Experiences to Enhance STEM Learning through Undergraduate, Team-based, Summer Research Projects for At-risk Students.” in the book *Cases on Research-Based Teaching Methods in Science Education* as published this year. Authors: Jennifer Yantz, Brittany D. Smith, Ginger Holmes Rowell, Thomas Cheatham, Donald Nelson, Chris Stephens and Elaine Bouldin Tenpenny.

Walsh, Dennis

Author of triangular sequence A243987 in the Online Encyclopedia of Integer sequences, June 16 2014 [see <http://oeis.org/A243987>]

Provided new matrix interpretation for sequence A000169 in the Online Encyclopedia of Integer Sequences, May 27 2014 [see <http://oeis.org/A000169>]

Provided new interpretation for sequence A002426 in the Online Encyclopedia of Integer Sequences, May 08 2015 [see <http://oeis.org/A002426>]

Ye, Dong

SIAM Journal on Discrete Mathematics, 28 (3) (2014) 1628 –1637. Yezhou Wu, Dong Ye, Wenan Zang and Cun-Quan Zhang, Nowhere-zero 3 -Flows in Signed Graphs

Electronic Journal of Combinatorics, 24 (4) (2014) P4.37:1–19. Dong Ye and Heping Zhang, Face-width of Pfaffian braces and polyhex graphs on surfaces

Decomposing plane cubic graphs. Kenta Ozeki and Dong Ye. European Journal of Combinatorics, accepted.

HOMO-LUMO Gaps for Sub-graphenic and Sub-buckytubeic Species. Douglas J. Klein, Yujun Yang and Dong Ye. Proceedings of the Royal Society A, accepted.

Wu, Qiang

Sparse Representation in Indefinite Kernel Machines. In press. Accepted by IEEE Transactions on Neural Networks and Learning Systems in Nov 2014; published online in 1/2015; joint work with H. Sun

Consistency analysis of minimum error entropy algorithm. In press. Accepted by Applied and Computational Harmonic Analysis on 12/16/2014; published online 12/23/2014; joint work with J. Fan, T. Hu and D.X. Zhou

A new approach for physiological time series. Accepted by Advances in Adaptive Data Analysis on 3/27/2015; joint work with D. Mao and Y. Wang

Faculty Presentations 2014-2015

Barlow, Angela

Project IMPACT2: Examining the Role of Mindset in Professional Development. with Alyson Lischka, Kristin Hartland, and Chris Willingham, National Council of Supervisors of Mathematics, Annual Conference, Boston, MA, April 13 – 15, 2015.

Patterns of Variation and Productive Discourse: An International Comparison with Kyle Prince, National Council of Teachers of Mathematics, Research Conference, Boston, MA, April 13 – 15, 2015.

Three Effective Uses of Unknown Student Work with Natasha G. Johnson, National Council of Teachers of Mathematics, Annual Conference, Boston, MA, April 15 – 18, 2015.

CCSSM: How far do we have to back up? Kristin Hartland and Chris Willingham, National Council of Teachers of Mathematics, Annual Conference, Boston, MA, April 15 – 18, 2015.

Two Learning Spaces, One Task: An Examination of Task Implementation in Chinese and Chinese and U.S. Classrooms with Rongjin Huang and Teresa Schmidt, Association of Mathematics Teacher Educators, Annual Conference, Orlando, FL, February 12 – 14, 2015.

Lesson Study as a Vehicle to Support the Development of Mathematics Teacher Educators with Kristin Hartland, Ameneh Kassae, Jeffrey Pair, and Teresa Schmidt, Association of Mathematics Teacher Educators, Annual Conference, Orlando, FL, February 12 – 14, 2015

Implementing Effective Mathematics Teaching for All Students through Lesson Study with Rongjin Huang, Kim Day, and Kyle Prince, MTSU STEM Education Research Conference, Murfreesboro, TN, February 5 – 6, 2015.

The Influence of Mindsets on Professional Learning with Alyson E. Lischka, D. Christopher Stephens, James C. Willingham, and Kristin S. Hartland, MTSU STEM Education Research Conference, Murfreesboro, TN, February 5 – 6, 2015.

Transitioning from Practicing Teacher to Teacher Leader: A Case Study with Natasha Gerstenschlager, National Council of Teachers of Mathematics, Regional Conference, Houston, TX, November 19 – 21, 2015.

Views of Coaching Practice Expressed by School-based Coaches MTSU Seminar Series, Murfreesboro, TN, September 2, 2014.

Bleiler, Sarah

Bleiler, S. K., & Pair, J. D. (2015, June). *Co-constructing a group proof*. Session to be presented at the Legacy of R.L. Moore Conference, Austin, TX.

Boyle, J. D., Bleiler, S. K., Ko, Y-Y., and Yee, S. P. (2015, April 17). *What counts? Developing a communal classroom criteria of proof*. Session presented at the National Council of Teachers of Mathematics Annual Meeting, Boston, MA.

Boyle, J. D., Bleiler, S. K., Yee, S. P., and Ko, Y-Y. (2015, April 14). *Constructing viable arguments and critiquing the reasoning of others: Where to start?* Session presented at the National Council of Supervisors of Mathematics Annual Meeting, Boston, MA.

Pair, J. D., & Bleiler, S. K. (2015, April 13). *Student perceptions of proof as communication in an inquiry-based course*. Session presented at the National Council of Teachers of Mathematics Research Conference, Boston, MA.

Yee, S. P., Boyle, J. D., Ko, Y-Y., & Bleiler, S. K. (2015, February 28). *Empowering ownership of proof with communal proof-writing criteria*. Session presented at the 42nd Annual Meeting of the Research Council on Mathematics Learning, Las Vegas, NV.

Pair, J. D., & Bleiler, S. K. (2015, February 20). *Partial unpacking and the use of truth tables in an inquiry-based transition to proofs course*. Session presented at the 18th Annual Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Bleiler, S. K., & Pair, J. D. (2015, February 19). *Roles of proof in an undergraduate inquiry-based transition to proof course*. Session presented at the 18th Annual Conference on Research in Undergraduate Mathematics Education, Pittsburgh, PA.

Ko, Y-Y., Yee, S. P., Bleiler, S. K., & Boyle, J. D. (2015, February 12). *Creating classroom-developed criteria for what counts as proof*. Session presented at the Association of Mathematics Teacher Educators 19th Annual Conference, Orlando, FL.

Bleiler, S. K., & Pair, J. D. (2015, February 6). *Engagement in roles of proof within an inquiry-based transition-to-proof course*. Session presented at the Tennessee STEM Education Research Conference, Murfreesboro, TN.

Pair, J. D., & Bleiler, S. K. (2014, November 6). *Student perceptions of the systematization role of proof*. Session presented at the Mid-South Educational Research Association Annual Meeting, Knoxville, TN.

Stephens, D. C., Baxter, W. A., & Bleiler, S. K. (2014, September 27). *Model with mathematics: Three key decisions*. Session presented at Tennessee Mathematics Teacher Association Annual Meeting, Knoxville, TN.

Yee, S. P., Ko, Y-Y., Bleiler, S. K., & Boyle, J. D. (2014, July 16). *Communal assessment of proof: Undergraduates' development of proof-writing criteria*. Poster session presented at the Joint Meeting of the International Group for the Psychology of Mathematics Education (PME 38), Vancouver, Canada.

Chappell, Michaele

"*STEAM: An innovative approach to promote mathematics*". - Derek Smith and I presented at NCTM in Boston in April.

Lisa Green

US Conference on Teaching Statistics (USCOTS), Pennsylvania State University, May 2015. (Not attending, but preparing presentations for attendees.) Modules for Teaching Statistics with Pedagogies using Active Learning (MTStatPAL) as a part of a Flipped Classroom Model. Pre-conference Workshop. Co-author. This workshop will be presented by Dr. Ginger Rowell and Natasha Gerstenschlager. Other co-authors: Scott McDaniel, Nancy McCormick, Jeremy Strayer.

Modules for Teaching Statistics with Pedagogies using Active Learning (MTStatPAL) Posters and Beyond. Accepted in a peer review process to present research results and materials developed from MTStatPAL project. Co-author. This poster will be presented by Dr. Ginger Rowell and Natasha Gerstenschlager. Other co-authors: Scott McDaniel, Nancy McCormick, Jeremy Strayer.

Tennessee STEM Education Research Conference. Murfreesboro, TN, February 2015. "Changing the Teaching of Applied Statistics to Incorporate Activities which Promote Student Engagement for Success." Lisa Green*, Scott McDaniel, Nancy McCormick*, Jeremy Strayer, Ginger Rowell*, and Natasha Gerstenschlager

MTSU CBAS Scholar's Day, Murfreesboro, TN, March 2015. "Statistics Education Research Questions." McCormick, Green, McDaniel, Strayer, Rowell.

James Hart

Kickstarting Classroom Discussions: The Flipped Classroom and Conceptual Understanding. Tennessee STEM Research Conference (Feb 5 – 6 2015) Joint with Jeremy Strayer

Don Hong

Invited talk at High-Dimensional Data Analysis Workshop held at the Department of Computer Science , Tennessee State University, Nashville, Tennessee, USA. April 16-17, 2015.

Invited talk on Statistical Computing Schemes for Hyper-spectral Type Data Processing in Medical Applications, at the International Conference on Learning and Approximation held at Fudan University, Shanghai, China, December 8-12, 2014.

Seminar talk on Hyper-spectral Type Data and Statistical Processing Methods with Applications in Medical Imaging and Images, at the College of Sciences, < a href="http://www.ncut.edu.cn/waiban/waiban-English/index.html">North China University of Technology, Beijing, China, November 17, 2014.

Lu Xiong and Don Hong, Using Monte Carlo Simulation to Predictive Captive Insurance Solvency. The Actuarial Research Conference, August 2014, UCSB.

Huang, Rongjin

Prince, K., Huang, R., & Barlow, A. (2015). Designing and implementing mathematics tasks in mathematics lessons: An analysis of two exemplary lessons of the same topic in China and the US. Paper to be presented at Research conference, National Council of Mathematics Teachers Annual Meeting, April 13-15, 2015, Boston.

Huang, R. (2015). Implementing mathematics teaching that promotes students' learning through lesson study. Paper to be presented at 2015 American Education Research Association annual conference, April 16-20, Chicago, Illinois.

Huang, R., Angela, B., & Schmidt, T., (2015). Two Learning Spaces, One Task: An Examination of Task Implementation in Chinese and U.S. Classrooms. Paper to be presented at The Nineteenth Annual Conference of the Association of Mathematics Teacher Educators, February 12-14, 2015, Orlando, Florida

Kimmins, Dovie

Do Students with Disabilities Have Access to Effective Mathematics Instruction? A Comparison of Special and General Education Teacher's Beliefs and Ability to Problem Solve. Annual Meeting of the Research Council on Mathematics Learning (RCML), February 28, 2015, Las Vegas

Are All Lines Straight? An Exploratory Study of Student Conceptions of the Meaning of "Line." Annual Conference of School Mathematics and Science Association (SSMA), November 2014, Jacksonville, FL.

Khaliq, Abdul

SIAM Conference on Financial Mathematics and Engineering. Chicago, IL, USA, Nov. 13-15, 2014

Mini symposium invited speaker: Regime Switching Models for American Option

Leander, Rachel

Mathematical Biosciences Institute Workshop: Targeting Cancer Cell Proliferation and Metabolism. *Modeling intermitotic time distributions.* March 23-27, 2015.

Joint Mathematics Meeting in San Antonio. Special Session: Applications of Dynamical Systems to Biological Models. *Modeling the dynamics of intermitotic time distributions.* January 10, 2015.

Modeling Stochasticity in Cell Cycle Progression. CBAS research exchange on November 18, 2014.

Lischka, Alyson

NCTM Research Session. Lischka, A. E. & Sanchez, W. B. (2015, April). *Scholarly Practice in Methods: Examining Revisions of a Task.* Presentation at the National Council of Teachers of Mathematics Research Conference, Boston, MA.

NCSM National Conference. Barlow, A. T., Lischka, A. E., Hartland, K. S. & Willingham, J. C. (2015, April). *Project IMPACT2: Examining the Role of Mindset in Professional Development.* Presentation at the 47th National Council of Supervisors of Mathematics Annual Conference, Boston, MA.

AMTE Annual Conference. Lischka, A. E., Kastberg, S., Hillman, S. & Hartland, K. S. (2015, February). *Learning about Prospective Teachers Learning about Feedback.* Presentation at the Annual Meeting of the Association of Mathematics Teacher Educators, Orlando, FL.

MSERA Annual Meeting. Barlow, A. T., Lischka, A. E., Hartland, K. S., Willingham, J. C., & Stephens, D. C. (2014, November). *The Impact of Mindset on Instructional Practices and Professional Learning.* Presentation at the 43rd Annual Meeting of the Mid-South Educational Research Association, Knoxville, TN.

TMTA State Mathematics Conference. Lischka, A. E. & Hartland, K. S. (2014, September). *Using Mathematical Processes to Investigate Misconceptions With Visualizations.* Presentation at the State Conference of the Tennessee Mathematics Teachers Association.

Joint Meeting of PME and PME-NA. Sanchez, W. B. & Lischka A. E. (2014, July). *Views of Mathematical Processes: A Framework.* Presentation at the Joint Meeting of the International Group for the Psychology of

Mathematics Education (PME 38) and the North American Chapter of the Psychology of mathematics Education (PME-NA 36), Vancouver, Canada.

Martin, Mary

Technological Encounters in Mathematics Classrooms. Featured co-speaker at the 2014 American Mathematical Association of Two-Year Colleges National Convention, Nashville TN, Nov 2014

TBR Mobilization Initiative, Apps focus. Webinar presentation, co-presenter, November 2014; Featured MathInk App.

Are All Lines Straight? : An Exploratory Study of Students' Views of the Meaning of "Line". SSMA Conference, Jacksonville FL, November 2014. Written with D Kimmins, J Winters, & T Schmidt.

McCormick, Nancy

Green, L., McDaniel, S., McCormick, N., Strayer, J., Rowell, G., & Gerstenschlager, N. (Feb 2015). Changing the Teaching of Applied Statistics to Incorporate Activities which Promote Student Engagement for Success. *Presented at the Tennessee STEM Education Research Conference*, Murfreesboro, TN.

Melnikov, Yuri

Yuri A. Melnikov and V. Borodin, Green's functions for boundary-value problems simulating potential fields in regions of irregular configuration on surfaces of revolution, *1107 AMS Regional Meeting*, Georgetown University, Washington, DC, March 2015.

Quinn, Terrance

6th International Lonergan Conference, Functional Collaboration in the Academy: Advancing Bernard Lonergan's Central Achievement. Co-organizer, lead presentation. July 2014

Rowell, Ginger

US Conference on Teaching Statistics (USCOTS), Pennsylvania State University, May 2015.

Pre-conference Workshop. Presented with Natasha Gerstenschlager, Lisa Green, Scott McDaniel, Nancy McCormick, Jeremy Strayer. Accepted in a peer review process to present research results and materials developed from MTStatPAL project. Presented with Natasha Gerstenschlager, Lisa Green, Scott McDaniel, Nancy McCormick, Jeremy Strayer.

Closing Session: *What's Right with Undergraduate Statistics?* Invited speaker with five others from across the nation to each brief present on this given theme at the closing session of USCOTS

Joint Mathematics Meetings, San Antonio, TX January 2015

Brittany D. Smith*, Jesse Beck, Jennifer Yantz, Thomas Cheatham, Donald Nelson, Ginger Holmes Rowell and Chris Stephens. National Science Foundation, Mathematical Association of America .

Tom Cheatham, Don Nelson, Chris Stephens, Ginger Holmes Rowell (primary author of this poster), Brittany Smith*, Jennifer Yantz. *Tennessee STEM Education Research Conference. Murfreesboro, TN, February 2015*

Ameneh Kassae* and Ginger Rowell*

Jennifer Dye* (Pope John Paul II High School), Ginger Rowell* and Tom Cheatham.

Lisa Green*, Scott McDaniel, Nancy McCormick*, Jeremy Strayer, Ginger Rowell*, and Natasha Gerstenschlager*

Stephens, Chris

Joint Mathematics Meetings, San Antonio, TX January 2015. "Introductory Research Experiences at the End of the First Year of College." Brittany D. Smith*, Jesse Beck, Jennifer Yantz, Thomas Cheatham, Donald Nelson, Ginger Holmes Rowell and Chris Stephens.

National Science Foundation, Mathematical Association of America Poster Session. "Middle Tennessee State University Mathematics as a FirstSTEP to Success in STEM." Tom Cheatham, Don Nelson, Chris Stephens, Ginger Holmes Rowell (primary author of this poster), Brittany Smith*, Jennifer Yantz.

Tennessee STEM Education Research Conference. Murfreesboro, TN, February 2015. "The influence of Mindsets on Professional Learning." Alison Lischka, Angela Barlow, Chris Stephens, James Willingham*, and Kristin Hartland*.

Strayer, Jeremy

Hanson, B. R., Strayer, J. F., Mangione, K., Brown, J., & Pair, J. Implementing GAISE recommendations through "doing statistics" tasks. 9th International Conference on Teaching Statistics.

Strayer, J.F., McCormick, N., Gerstenschlager, N., Green, L., McDaniel, S., Rowell, G. (2014). *Observations of implementation of an active learning module in introductory statistics*. Paper presented at the International Conference on Teaching Statistics 9 meetings, July 14-18, 2014 Flagstaff, AZ.

Hart, J.B., Strayer, J.F. (2015). Kickstarting classroom discussions: The flipped classroom and conceptual understanding. Paper presented at the TSEC 2015 STEM Education Research Conference, February 2015.
Gerstenschlager, N., Green, L.B., McCormick, N., McDaniel, S., Rowell, G.H., Strayer, J.F. (2015). *Changing the teaching of applied statistics to incorporate activities which promote student engagement for success*. Paper presented at the TSEC 2015 STEM Education Research Conference, February 2015.

Ye, Dong

Spanning subgraphs and cycle covering. 2014 AMS Central Sectional meeting at University Wisconsin Eau Claire, September 20-21, 2014

Decomposing Cubic Graphs with Low Genus. Combinatorics Seminar of University of Mississippi, October 9, 2014

Graph Inevitability and Median Eigenvalues. Graph Theory and Combinatorics Seminar, Vanderbilt University, November 10 2014

Inverses of Bipartite Graphs. Graph Theory and Combinatorics Seminar, Vanderbilt University, March 23 2015
Cycle Double Cover of Graphs I & II, State Key Laboratory of Mathematics and School of Mathematical Sciences, University of Science and Technology of China, June 1 and June 3, 2015. (Invited)

Inverses of Graphs, International Workshop of Graph Theory and Combinatorics, Central China Normal University, May 30-31, 2015. (Invited)

Cycle Cover of Graphs: Circumference and Spanning Minors, Key Laboratory of Applied Mathematics and Complex Systems, and School of Mathematics & Statistics, Lanzhou University, May 19, 2015. (Invited)

Wu, Qiang

Coordinate kernel polynomial models for interactive component identification. International conference on learning and approximation, 12/2014

MATHEMATICAL SCIENCES FACULTY SERVING ON EDITORIAL & REVIEW BOARDS

Barlow, Angela

NCSM Journal of Mathematics Education Leadership. Journal Editor – 2013 - 2015

Bleiler, Sarah

Member, Editorial Board, *The Mathematics Educator* (International journal out of Singapore). Spring 2014-present.

Ding, Wandu

Editor - International Journal of Mathematics and Statistics.

Editor - Society for Mathematical Biology (SMB) Digest

Green, Lisa

Associate Editor, CAUSEweb.org

Hong, Don

Editor-in-Chief: Journal of Health & Medical Informatics

Editorial Board: International Journal of Computational Mathematics

Editorial Board: American Research Journal of Mathematics

Editorial Board: International Journal of Mathematics and Computer Science

Editorial Board: Journal of Applied Functional Analysis

International Editorial Member: Chinese Association for Artificial Intelligence (CAAI) Transactions on Intelligent Systems

Huang, Rongjin

Guest Editor of ZDM Journal 2016 (3); Edit (with Yoshinori Shimizu) a special issue of ZDM 2016 (3) - international journal on *mathematics* education, including 12 articles from 8 countries.

Khaliq, Abdul

Guest Editor (with Q. Sheng and J. Ku) of Special issue, Recent Advances on the Numerical Methods for System of PDEs, Journal of Computational and Applied Mathematics, in progress.

Editor-in-Chief, International Journal of Computer Mathematics

Associate Editor, Journal of Computational and Applied Mathematics

Associate Editor, Punjab University Journal, Pakistan.

Member Editorial Board, Numerical Methods for Partial Differential Equations

Member Editorial Board, Journal of Computational Methods in Science and Engineering

Rowell, Ginger

Editor CAUSEweb Peer-Reviewed Resources Collection for the Consortium for the Advancement of Statistics Education (CAUSE)

Editor for the Statistics Portal of the Multimedia Education Resource for Learning and Online Teaching (MERLOT)

Editor, statistical advisor, and consultant for the TBR development of a MOOC on AP Statistics through EdX. Fall 2014–present

Ye, Dong

Editor of International Journal of Mathematics and Statistics

MATHEMATICAL SCIENCES FACULTY SERVING AS JOURNAL, MANUSCRIPT, ETC. REVIEWERS

Barlow, Angela

TCM Guest Blogger

This year, I reviewed for the following journals: *Journal of Research in Mathematics Education*, *Mathematics Teacher Educator*, *Teaching Children Mathematics*, *Mathematics Teacher*, and *ZDM: The International Journal on Mathematics Education*.

Bleiler, Sarah

Manuscript Reviewer

Journal of Mathematics Teacher Education (fall 2014-present)

The Mathematics Educator (Singapore) (spring 2014-present)

ZDM: The International Journal on Mathematics Education (spring 2012-Present)

Mathematics Teacher (fall 2008-Present)

Chappell, Michaele

Reviewer for NCTM Journal, *Mathematics Teaching in the Middle School*; I reviewed 2 manuscripts during the year.

Ding, Wandu

Referee - Reviewed 5 papers for International Journal of Dynamics and Control, Applied Mathematical Modeling, Journal of Applied Animal Welfare Science, Journal of Optimization Theory and Applications

Green, Lisa

Performed as a peer reviewer for the journal Teaching Statistics

Reviewed chapters for Lehman's Pre-Statistics book. Pearson.

Khaliq, Abdul

SIAM Journal on Scientific Computing

SIAM Journal on Financial Mathematics 3. 3.Computers & Mathematics with Applications

International Journal of Computer Mathematics

Numerical Methods for Partial Differential Equations.

Applied Numerical Mathematics

Journal of Computational and Applied Mathematics .

Applied Mathematics and Computation

Leander, Rachel

I have refereed multiple papers this year.

S. Athithan and Mini Ghosh. "Optimal Control of Tuberculosis with Case Detection and Treatment." *International Journal of Mathematics and Mathematical Sciences*. (May 2014)

Yousefi, Sohrabali; Mamerashi, Kamal, "Numerical solution of a class of two dimensional quadratic optimal control problem by using Ritz method." *Optimal Control Applications and Methods* (April 2015)

Chris Guiver, Christina Edholm, Yu Jin, Markus Mueller, Jim Powell, Richard Rebarber, Brigitte Tenhumberg, and Stuart Townley. "Simple adaptive control for positive linear systems with applications to pest management." *SIAM Journal of Applied Mathematics*. (March 2015)

Lischka, Alyson

Journal Reviewer – NCTM's Mathematics Teacher

Conference Proposal Reviewer – AMTE Annual Conference

Conference Proposal Reviewer – NCTM Research Conference

ORAU Ralph Powe Award Program Reviewer

Martin, Mary

3 reviews of electronic media for MERLOT

Quinn, Terrance

Reviewer, *Dialogues in Philosophy, Mental and Neurosciences*.
 Reviewer, *Tennessee Academy of Science*
 Reviewer: *Zygon: Journal of Religion and Science*
Rowell, Ginger
 NSF Reviewer
 Reviewer for Statistics Education Materials
 Member: *GAISE Revision Committee - A National Committee for Statistics Education*
Stephens, Chris
 Refereed papers for *Journal of Graph Theory*
Strayer, Jeremy
 Mathematics Teacher reviewer
 Journal of Research in Mathematics Education reviewer
 CITE Journal reviewer
 Wu, Qiang
 Reviewed more than 10 manuscripts for several scientific journals.
 Reviewer for AMS Math Review data base.
Ye, Dong
 Referee 11 papers for 7 journals
 Review 2 papers for Math Review
Zha, Xiaoya
 Referee for several professional math journals

Professional Leadership/Service Activities

Barlow, Angela

Committee Chair	AMTE Mentoring Committee. Committee Member – 2012 – 2015, 2013 – 2015
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Sarah Bleiler

Regional Chair	Tennessee High School Mathematics Contest, TMTA
Conference Proposal Reviewer	RUME Annual Conference (2015)
Member	Middle Tennessee Mathematics Teacher Education Partnership Team (2013-present)
Conference Volunteer	NCTM Research Conference (presider, Interactive Paper Session), April 15, 2015

Wandi Ding and Rachel Leander

Organizers	Chair and Co-organizer. Society for Industrial and Applied Mathematics (SIAM) Conference on the Life Sciences Mini-Symposium, Mathematical Modeling and Control of Ecological and Epidemiological Problems, Charlotte, NC, August 4-7, 2014.
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Wandi Ding and Zach Sinkala

Organizers	Chair and Co-organizer. American Mathematical Society (AMS) Southeastern Spring Sectional Meeting, Special Session on Recent Trends in Mathematical Biology, Huntsville, AL, March 27-29, 2015
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Lisa Green

NSF Reviewer	Served as a panel member for NSF IUSE grants. Washington, DC, Spring 2015.
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Rongjin Huang

Organizer.	Symposium, adoption or adaptation: lesson study in mathematics. At AERA 2015.
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One of four founders of Special Interest Group, Lesson study	Establishment of a SIG Lesson Study at AERA, serving as the Treasurer.
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Abdul Khaliq

Organizer	AMS Special Session, Recent Advances in the Analysis and Applications of Modern Splitting Method , Joint Mathematics Meetings Henry B. Gonzalez Convention Center and Grand Hyatt San Antonio, San Antonio, TX, USA, January 10-13, 2015.
Organizer	Two Mini-Symposiums, High Order Numerical Methods for System of Partial Differential Equations with application, SIAM Annual meeting, Chicago, IL, USA, July 7-11, 2014

Dovie Kimmins

Member of THEC Higher Education Common Core Implementation Advisory Board	Participated in board meetings which advised the development and training to support video and online resources to support teacher preparation in Tennessee. Worked to publicize these materials to MTSU teacher education faculty
On Nominations Committee for School Science and Mathematics	Participated in one committee meeting at annual conference in Jacksonville in November 2014

Alyson Lischka

Workshop provided for TNCore on the campus of MTSU	Lischka, A. E. & Hartland, K. S. (2014, September). Using Student Work on Tasks as Formative Assessment, 1 Day Workshop provided for TNCore Mid-Cumberland Region at MTSU.
Mentoring Committee	Association of Mathematics Teacher Educators

Mary Martin

Direct Algebra I Employment Standards Training for the State of Tennessee	Conduct 40 hour workshops (during one week); three locations across state and in fulfillment of State Law for Middle School Mathematics teachers to meet the requirements of the employment exception law. Trained 40+ teachers at 3 sites this year. Approximately 600 teachers trained across the state in the last 6 years. Provides visibility to MTSU through at least 10 counties per summer. Design curriculum, schedules, testing, hiring, budget, assessment, and reports to State of Tennessee. Also designed and directed two hybrid offerings during academic year
Associate Mathematics Editor, MERLOT website	Review websites and publish reviews for P-16 mathematics online materials. Internationally recognized website for STEM.
Member of TBR Mobilization Project	Attend meetings and work on recommendations for technology for TBR; receiving training on newest technology – 2011 to present
Member, State Board of Examiners	Serve on Academic Audit teams for various academic Departments in State of Tennessee, including TBR and UT system. Performed one academic audit this year.
Served on State of Tennessee PAEMST Award Committee	(Note: this is highly confidential and cannot be distributed. Service for State of TN Dept. of Education. Selection committee for Presidential Teacher Award Nominations from Tennessee to Federal Program)
Membership reviewer	Sigma Xi

Terry Quinn

Co-organizer	Annual international conference, The SOCIETY for the GLOBALIZATION of EFFECTIVE METHODS of EVOLVING, July 2014, University of British Columbia, Vancouver, Canada.
President	SGEME

Ginger Rowell

MTSU NSF GK-12 TRIAD Grant Evaluation	Annual Evaluation and Report to NSF (March 2015)
External Evaluation	Supported MTSU NSF IUSE (Improving Undergraduate STEM Education) grant proposals as external evaluators when called upon to do so. Some get funded some do not. I helped 2 or 3 MTSU projects at the proposal time this year.
NSF Reviewer	Reviewed for NSF Division of Undergraduate Education once this year.
Reviewer for Statistics Education Materials	Reviewed, among other things, content for a highly innovative on-line text in statistics education and a textbook with a new approach for teaching introductory statistics (randomization)
Advisory Board	Advisory board member for on-line text in statistics education. 2014.
GAISE Revision Committee	Invited member National Committee for Statistics Education of the American Statistical Association supported 2015 GAISE (Guidelines for Assessment and Instruction in Statistics Education) Revision Committee 2014-2015
Editor CAUSEweb Peer-Reviewed Resources Collection for the Consortium for the Advancement of Statistics Education (CAUSE) and Editor for the Statistics Portal of the Multimedia Education Resource for Learning and Online Teaching (MERLOT)	January 2015, I started as editor for these two peer-reviewed online collections of statistics education teaching and learning materials. This is a dual appointment. Training for the role is complete and I am starting the process of reviewing submissions, selecting assistant editors, recruiting reviewers and will be writing reviews of materials.
Tennessee Board of Regents Massive Open Online Course (MOOC) for AP Statistics	I am the editor, statistical advisor, and consultant for the TBR development of a MOOC on AP Statistics through EdX. Fall 2014 – present.

Stephens, Ye, Zha

Organizers	Co-organizer of special session on graph theory at AMS sectional meeting in Huntsville, AL, March 2015 (with Xiaoya Zha and Dong Ye).
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Qiang Wu

Organizer	Mini-symposium for SIAM-SEAS 2015 conference: Recent Advances in Statistical Learning Theory.
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Grant applications submitted (pending or non-funded) with Department faculty as the PI/Co-PI

	TITLE	SOURCE	PI/CO-PI	AMT REQ.	
1	REU Site: MTSU Imaging Science	NSF	Don Hong Co-Pi	\$227,016	Not Funded
2	Statistical Computing Models for Captive Insurance Solvency	The Society of Actuaries, The Actuarial Foundation proposal	Don Hong	\$15,000	Not Funded

3	Scaling Up Success in Pathways Precalculus	TBR	Hart/Strayer	\$9,000	Not Funded
4	Biological Sciences and Global Care. PI.	John Templeton Foundation	Terrance Quinn	\$105,000	Not Funded
5	Co-PI. Graduate Teaching Assistant PREPS (Professional Development, Resources, & Engagement for Pedagogy in STEM) Fellows. .	NSF	Sarah Bleiler Co-PI	\$536,000	Under review.
6	Inquiry-Based Learning in an Upper- Level Introduction to Mathematical Proofs Course: Using Cases for the Professional Development of Undergraduate Mathematics Instructors.	Academy of Inquiry-Based Learning	Sarah Bleiler Co-PI	\$4,200	
7	Modulation of Macrophage Inflammatory Signaling by Intracellular <i>Cryptococcus neoformans</i> , with D. Nelson, E. McClelland, R. Leander,	NIH R15	Wandi Ding Co-PI	\$386,700	Pending
8	Real World Partners for Academic Research in Computational Science	NSF-IGE	Wandi Ding Co-PI	\$393,619	Pending
9	STEM Ability, Gaming and Education (SAGE) Partnership	NSF	Wandi Ding Co-PI	\$2,390,242	Pending
10	“Extend MTStatPAL to Community Colleges: A Pilot Study”	NSF Supplement Request for MTStatPAL	Rowell, Green, McCormick, Strayer	\$48,558	Pending
11	Active Learning in Introductory Statistics” Faculty Learning Community Proposal	MTSU Learning, Teaching, and Innovative Technologies Center	Rowell, Green, McCormick, Strayer	\$12,000	Pending

12	Investigating the sources and implications of stochasticity in cellular proliferation and death	NSF	Rachel Leander	\$624,834	Pending
13	Modulation of Macrophage Inflammatory Signaling by Intracellular Cryptococcus neoformans	NIH R15	Rachel Leander	\$300,000	Pending
14	MTSU Instructional Evaluation and Development grant	Academic Affairs	Nancy McCormick	\$1537.50	Pending
15	Modelling interactive components by kernel methods	NSF	Qiang Wu	\$166,234	Pending
16	Statistical learning theory and applications	Simons Foundation	Qiang Wu	\$35,000	Not Funded
17	TBR Research Proposal	TBR	Angela Barlow	\$30,000	Not Funded
18	Improving Teaching Practice and Student Performance in Mathematics through Lesson Study	TBR	Rongjin Huang	\$30,000	Not Funded
19	Real-World Partners for Academic Research in the Computational Sciences (RPAR)	NSF	Dong Ye	\$478,420	Pending
20	International Conference on Graph Theory and Applications	NSF	Dong Ye/ Xiaoya Zha	\$12,000	Pending
21	Participating the joint grant proposal to Department of Defense (with Fisk University as the leading institute)	DOD	Xiaoya Zha	\$2,000,000	Pending

TOTAL: \$4,099,950

Active Grants AY 2014-2015

Grant applications funded with Mathematical Sciences faculty as PI/Co-PI

1	Barlow, Lischka, Stephens	IMPACT3	TDOE	\$218,000	January 2015 – June 2016	6 hours summer salary (summer 2014), 3 hours release time (spring 2014, fall 2014, spring 2015)
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2	Barlow and Lischka	IMPACT2	TDOE	\$344,000	January 2014 – June 2015	6 hours summer salary (summer 2014), 3 hours release time (spring 2014, fall 2014, spring 2015)
3	Ding	ADVANCE	NSF	\$195,000		
4	Ding	Learning Community Proposal		\$7,500	2014-2015	
5	Green, Rowell, McCormick, Strayer	Modules for Teaching Statistics with Pedagogies using Active Learning (MTStatPAL)	NSF	\$175,000	July 2013 – Dec 2016	
6	Green, Rowell, McCormick, Strayer	MTStatPAL Workbook and Daily Integration Plan	TBR	\$13,500	2014-15	
7	Huang, Kimmins	Project UnPACK	THEC	\$73,057	2015-2016	
8	Huang	Implementing Effective Mathematics Teaching for All Students through Lesson Study (IEMT). Mathematics and Science Partnership Program	TDOE	\$39,000	2014-2015	
9	Kimmins	Project RISE	TDOE	\$33,361	1/1/15 – 6/30/16	
10	Lischka	Scholarly Inquiry and Practices (SIP) Conference for Mathematics Education Methods	NSF: DRK-12	\$100,000	June 2015	
10	Rowell, Stephens, Tenpenny, Nelson	FirstSTEP	NSF	\$2,000,000	June 2010 – May 2016	
11	Strayer	Scaling Up Success in Pathways Precalculus	TBR	\$9,000	2015-2016	
12	Ye	Collaborative Research Grants: Flows, Coloring and Cycle Covering of Signed Graphs. \$35,000	Simons Foundation	\$35,000	2015-2019	
13	Qiang Wu	Educational Institution Grant	Society of Actuaries	\$5,000	June 2015	

			New Money AY 2014-2015	\$728,418		
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Grant Supported Faculty Releases

Fall 2014

Barlow	3	IMPACT
Ding	3	APDA
Green	3	MTStatPAL
Lischka	3	IMPACT
McCormick	3	MTStatPAL
Rowell	3	FirstSTEP
Stephens	3	IMPACT
Strayer	3	MTStatPAL
	24	

Spring 2015

Barlow	3	IMPACT
Chappell	3	MTF
Ding	3	ADVANCE
Kimmins	2	MSP
Lischka	3	IMPACT
Rowell	3	FirstSTEP
Rowell	3	TBR
Stephens	3	IMPACT
Strayer	3	MTStatPAL
Wu	3	TBR
Ye	3	FRCAC
	32	

Bachelor's Degrees AY 2014-15

Summer '14	Fall '14	Spring 2015
2	6	16
1 PROF	2 ASCI	2 ACSI
1 MAED	2 PROF	12 PROF
	2 MAED	1 MAED
		1
INDUST		

Graduate Program Student Placement Outcomes for Degrees Awarded in 2014-2015

			Degree awarded	Concentration	Placement post degree
1	Kyle	Prince	MST	MATE	MSE student, MTSU
2	Blair	Parsons	MST	MATE	Bedford County Schools
3	Ye	Ye	MS	MATH	Doctoral student in Department of Economics and Finance, MTSU
4	Alemayehu	Wolde	MSPS	PRSC/ACSC	Doctoral student in Department of Mathematics, University of Memphis
5	Chuanlun	Liu	MSPS	PRSC/ACSC	Employed in China
6	Gabriel	Owiredu-Boateng	MSPS	PRSC/ACSC	The Capital Market Company (Capco), Washington, DC
7	James	Walls	MSPS	PRSC/ACSC	
8	Lu	Zhang	MSPS	PRSC/ACSC	Actuarial Analyst at SIGMA Actuarial Consulting, Brentwood, TN
9	Ningyuan	Liang	MSPS	PRSC/ACSC	Employed in China

10	Tian	Zhang	MSPS	PRSC/ACSC	Graduate study at Florida State University
11	Jonathan	Afugu	MSPS	PRSC/BIOS	
12	Rachel	Baldwin	MSPS	PRSC/BIOS	
13	Muidhah	Alharbi	MS	MATH	
14	Saham	Alzahrani	MS	MATH	
15	Lauren	Chrisman	MSPS	PRSC/ASCI	Actuarial Analyst at Bryan, Pendleton, Swats & McAllister, Brentwood, TN
16	Yini	Yu	MSPS	PRSC/ASCI	Employed in Ningbo, China
17	Sara	Nasab	MS	MATH	Doctoral student at University of California Santa Barbara
18	Brian	Frazier	MS	MATH	
19	Sultan	Aloybi	MS	MATH	
20	Tawanda	Marume	MSPS	PRSC/BIOS	Sarah Cannon Research Institute
21	Wuyan	Li	MSPS	PRSC/ACSI	MS student in Department of Mathematical Sciences, MTSU
22	Yingxiao	Huang	MSPS	PRSC/BIOS	
23	Inhwa	Kim	MSPS	PRSC/BIOS	
24	Volodymyr	Borodin	Ph.D.	Melnikov	
25	Lu	Xiong	Ph.D.	Hong	Actuarial Associate, SIGMA Actuarial Consulting, Brentwood, TN
26	Rachel	Sefton	Ph.D.	Miller	

Students Passing Actuarial Exams

	Student	Exam	Program
1	David Mathews	P & FM	MS
2	Carson Cook	P & FM	MS
3	Shuzhe (Luke) Xu	P	MSPS
4	Shelley Williams	P	MSPS
5	Luisa Calle	P	BS
6	Guirong Fan	P	MSPS
7	Qin Zhou	P & FM	MSPS
8	Ye (Zoe) Ye	P,FM,MFE	MS/ECON
9	Brent Carpennetti	P,FM,MFE	MSPS
10	Adam Frenck	P,FM,MFE	MSPS
11	Wuyan Li	P,FM	MS
12	Jason P. Lockett	P	BS
13	Yunzhu Yang	P	BS
14	Lan Wang	P	BS
15	Menghan Lin	P,FM	MS/ECON

Teaching Advancement Plans for Fall

The Teaching Advancement Committee proposes that the Department of Mathematical Sciences implement Teaching Advancement Groups (TAGs) beginning in the Fall 2015 semester. Four TAGs will be offered in the Fall 2015 semester, and each will be related to one of the eight Mathematics Teaching Practices outlined in NCTM's

Principles to Actions (2014) document. The four mathematics teaching practices marked by a star will be the focus of the Fall 2015 TAGs.

APPENDIX 2— Five-Year Strategic Plan

VISION

The Department of Mathematical Sciences at Middle Tennessee State University is a community that is striving to share the beauty and power of mathematics and to be nationally and internationally esteemed for excellent teaching, research, and service in the mathematical sciences.

MISSION

The Department of Mathematical Sciences at Middle Tennessee State University works together to:

- provide students with a high quality mathematics education,
- conduct research, and
- lend our expertise to the campus and community.

CORE VALUES

MATHEMATICS: We value mathematics for its intrinsic beauty and its power to model and explain our world.

STUDENT LEARNING: We value student learning, and we seek to continually improve our teaching. We strive to put into practice what research tells us about good mathematics teaching and learning by taking advantage of professional development opportunities.

RESEARCH: We value research as a fundamental responsibility of our faculty and an essential part of student learning. We conduct, disseminate, and apply our research in order to engage and involve students, expand human knowledge, and positively contribute to society.

SERVICE: We understand the importance of using our expertise as mathematical scientists to serve the university and our broader communities. We embrace opportunities to serve as mathematical sciences representatives in both formal and informal settings.

STUDENTS: We value students as individuals. We partner with students, understanding the unique contexts from which they come, to help them grow as mathematicians, scientists, scholars, and citizens.

FACULTY and STAFF: We understand that a college Department is only as strong as its faculty and staff. We ask only the most qualified and capable faculty and staff to join our ranks, and we support each other in our work.

COMMUNITY: We value community as an important component of our individual and Departmental success. We strive to create a vibrant community of students, staff, and faculty by taking an interest in one other, respecting individual perspectives, cooperating, and collaborating.

DIVERSITY: We value diversity in its many forms – including gender, cultural, and mathematical diversity – and understand that diverse perspectives enrich our experience and expand our possibilities.

OUR STRENGTHS: Strong academic programs attract strong students. We recognize our unique strengths, and we leverage them to support the work of the Department and promote our

uniqueness and reputation as a place of excellence.

COMMUNICATION: We value communication among staff, students, and faculty. We understand that effective communication is vital for maintaining a strong Department, and we use multiple modes of communication to share information internally and externally.

KEY PRIORITIES

We strive for excellence in teaching, research and service. To support the achievement of our mission, we establish the following as key priorities:

- 1. Recruit, hire, support, and develop ambitious faculty to be highly involved in the work of the Department;**
- 2. Recruit, support, retain, and graduate high quality students who will succeed in the workforce, in schools as teachers, and / or in their continuing graduate studies;**
- 3. Plan, conduct, and publish the results of research that investigates important questions in the field;**
- 4. Support faculty as they plan, enact, and reflect upon their use of innovative and research-supported teaching practices;**
- 5. Advocate for facilities that are clean, comfortable, and of appropriate size to provide a professional working environment that supports the productivity of students, staff, and faculty; and**
- 6. Develop, revise, and maintain academic programs that both attract and meet the needs of students**

Key Priority #1 – Recruit, hire, support, and develop ambitious faculty to be highly involved in the work of the Department

As the CBAS strategic plan recognizes, the success of the College, and thus this Department, depends on the work of highly involved and well-supported faculty who are devoted teachers and successful scholars. This Department is dedicated to hiring and supporting faculty of the highest caliber. We recognize, as does the College, the importance of being a welcoming institution that both competitively compensates faculty and values work/life balance. We also recognize that faculty bring different strengths to their work in the Department, and some faculty members' work may look quite different from others'. For example, one faculty member may spend a great deal of time in service to the Department/university/community while another may spend a great deal of time conducting and supervising research projects. This fact is recognized in the CBAS strategic plan and it demands a commitment to offering faculty appropriate teaching/research/service workloads that are specific to each faculty member and their work.

We are in full agreement with the College's commitment to: 1) provide students with an outstanding undergraduate education with emphasis on "hands on" experiences and 2) develop and support acclaimed graduate programs. To accomplish this, we set the following goals:

GOALS:

- A. Ensure that the Department has a sufficient number of tenured or tenure-track faculty with the expertise to meet the teaching and research needs of the graduate programs the Department supports
- B. Ensure that the Department has a sufficient number of faculty with the expertise to meet the teaching needs of the undergraduate programs that the Department supports

- C. Ensure that the Department has a sufficient number of tenured or tenure-track faculty with enough K-12 teaching experience to supervise student teachers
- D. Increase job security for the faculty who are currently designated “full time temporary”
- E. Pair new hires with a faculty mentor for their first two years at the university

Key Priority #2 – Recruit, support, retain, and graduate high quality students who will succeed in the workforce, in schools as teachers, and / or in their continuing graduate studies;

We affirm that educating students in the mathematical sciences is the primary focus of our work. We therefore seek to promote the ways in which we successfully engage students in the learning of mathematics in order to attract a wide variety of students to our programs. We recognize that successful student mathematics learning persists beyond the courses students take – to internships, other courses, daily experiences, and ultimately the workforce. Therefore, we seek to create a student community among us who sees the work of doing mathematics as central to who they are as people. This community of students will value the mathematics endeavor, seek out opportunities to conduct research at any level, and will value doing the hard work of teaching (when tutoring, helping a friend, or teaching a course) that helps others in the community construct their own mathematical knowledge. Finally, in agreement with the CBAS strategic plan that “affirms that offering high-quality graduate education depends upon ... the support of high-achieving students through scholarships, teaching and research assistantships, and other forms of financial assistance,” we acknowledge the importance of supporting students. To make progress on these fronts, we set the following goals:

GOALS:

- A. Coordinate with the admissions office to have a recruiting presence in high schools
- B. Increase the number of students doing undergraduate research
- C. Continue to support the Pi Mu Epsilon student organization to create a sense of community among our majors
- D. Recruit our strong undergraduates into our graduate programs
- E. Support and mentor graduate teaching assistants in their teaching duties
- F. Increase graduate teaching assistant stipends by 25% (masters programs)
- G. Increase the graduate teaching assistant lines by 5 lines (masters programs)
- H. Improve advising of graduate students (masters programs)

Key Priority #3 – Plan, conduct, and publish the results of research that investigates important questions in the field;

The Department of Mathematical Sciences boasts a highly active research faculty in mathematics, statistics, and mathematics education. This Department is well positioned to be a frontrunner in research and innovation in many areas, and we are committed to supporting our faculty’s scholarly work. We affirm CBAS’ strategic plan that is committed to supporting all faculty so that their research, scholarship, and creative activity flourishes, and we acknowledge that funding opportunities for different research areas differ. While the Department’s faculty are committed to seeking and securing external funding to support research activity, we also call on the College and University to create and sustain an environment that supports and promotes this

Department's strong research activity. To promote research in the Department, we set the following goals:

GOALS:

- A. Develop faculty communities that meet to share scholarly work with one another
- B. Secure Departmental support to reduce the teaching workload for research active faculty members
- C. Support faculty members' travel to present their scholarly work at conferences and workshops
- D. Increase external funding awards over the next 5 years
- E. Work with administration to improve pre and post grant support for faculty

Key Priority #4 – Support faculty as they plan, enact, and reflect upon their use of innovative and research-supported teaching practices;

We are encouraged that the CBAS strategic plan includes a commitment to “providing support for faculty for professional development.” We acknowledge that it takes specialized, applied mathematical knowledge to effectively teach mathematics. This includes understanding the prior knowledge students must draw on when learning a new topic, knowing the many different ways a mathematical task could be solved, and understanding misconceptions students may have and common errors they may make when solving a task. Teachers must also know what kinds of questions to ask students to help them: 1) progress toward a solution when stuck, 2) focus on the important mathematics in a task, and 3) share their mathematical thinking with others. This is only a start. In addition, effective mathematics teachers must possess an understanding of how to assess student understanding, conduct productive whole class discussions of mathematical concepts, help students construct convincing mathematical arguments and proofs, and make connections between mathematical concepts and representations. Indeed, teaching is by no means a simple task. In order to support all faculty members in the Department to be highly engaged in the professional work of teaching, we establish the following goals:

GOALS:

- A. Support a faculty member to lead course communities for multi-section courses – this leader will coordinate assessment and support for teaching in multi-section courses
- B. Support a faculty member to lead faculty communities that work to assist faculty members as they grow in their teaching practice
- C. Develop effective and supportive formative and summative peer evaluation
- D. Create a repository of materials for the courses the Department offers

Key Priority #5 – Advocate for facilities that are clean, comfortable, and of appropriate size to provide a professional working environment that supports the productivity of students, staff, and faculty;

In accordance with the CBAS strategic plan's commitment to provide improved research facilities and enhance teaching facilities and technologies for the classroom, we acknowledge the importance of making improved facilities for this Department a key priority. As the college has

stated, “offering high-quality graduate education depends upon the maintenance and expansion of exceptional facilities.” We concur. Our work of offering high-quality graduate education often involves hosting scholars from other universities, potential collaborators, potential students, and current students in our facility. Unfortunately, the current facility in which this Department’s faculty, staff, and students work is more than inadequate. Restrooms are deplorable, there is not sufficient gathering space for students (who often must sit on the floor in the hallways) or for visitors, many faculty offices are the size of closets, computers in classrooms are too slow to make the SmartBoards and other technology operational, and the heating and cooling system is broken – costing the university untold dollars every year. Our students deserve better. Our faculty deserve better. We must fix our facility-related problems, and we must do it now. To make headway on this front, we set the following goals:

GOALS:

- A. Create a facilities committee that will communicate with the administration regarding facilities, including the many serious issues that exist in KOM
- B. Develop a short-term space-allocation plan that recommends reasonable ways to create community spaces in our existing facility
- C. Develop a long-term space-allocation plan that addresses our needs in a new building -- and keep this list updated

Key Priority #6 – Develop, revise, and maintain academic programs that both attract and meet the needs of students

We are in agreement with the CBAS strategic plan’s commitment to: “1) develop and maintain innovative degree programs that take advantage of existing strengths and interdisciplinary opportunities and 2) support new graduate initiatives and reaffirm its commitment to existing programs.” Students who complete a program offered by the Department of Mathematical Sciences will graduate with the skills necessary to solve important problems both within the mathematics discipline and in interdisciplinary contexts, think critically and flexibly, and communicate clearly in quantitative situations. We know that strong programs attract strong students because they meet the needs of those students, and we also recognize that those needs change from time to time. So that the Department’s programs remain flexible and poised to make an impact, we set the following goals:

GOALS:

- A. Modify the existing statistics minor to be an applied statistics minor
- B. Advertise and grow the new 5-year Accelerated Bachelor’s/Master’s programs in Biostatistics and Actuarial Science
- C. Interview employers of our students to discuss needed program changes
- D. Review programs at least every two years and propose needed revisions

Students enrolled in the COMS PhD program may obtain a Master of Science (MS) in mathematics under the general mathematics concentration. Students interested in this option must choose an MS Mathematics Faculty Advisor who will work with the student to ensure all criteria are met. The criteria for obtaining the MS are as follows:

- 1) The student must complete a minimum of thirty-six (36) graduate credit hours in mathematics or COMS-related fields. These hours must include the following.
 - a) **The COMS core courses**
The COMS core consists of
 - COMS 6100 (Fundamentals of Computational Science –3hrs)
 - COMS 6500 (Fundamentals of Scientific Computing -- 4hrs)
 - COMS 7300 (Numerical Methods – 4hrs)
 - b) **At least one Math MS Core course**
The MS Core consists of
 - MATH 6120 (Advanced Linear Algebra – 3hrs)
 - MATH 6170 (Sets and Logic – 3hrs)
 - MATH 6190 (Analysis I – 3hrs)
 - c) **Twenty-one (21) math content hours at the 6000-7000 level**
Courses selected must be approved by MS Faculty Advisor. Recommended courses include but are not limited to
 - MATH 6300 (Optimization – 3hrs)
 - MATH 6260 (Advanced Differential Equations – 3hrs)
 - MATH 7450 (Mathematical Modeling I – 3hrs)
 - MATH 7750 (Mathematical Modeling II – 3hrs)
 - STAT 7400 (Computational Statistics – 3hrs)
- 2) The student must take and pass the COMS qualifying examination. If the student does not take or does not pass this examination, then the student must complete the MS Core and pass the requisite MS comprehensive examinations.

Class Observation Protocol- Teaching Advancement Mathematics Department
Course: _____ Instructor: _____ Date: _____

What worked well in the class?

What could have been improved?

<p>I - Preparation and Planning</p> <ol style="list-style-type: none"> 1. Instructor was well-prepared for class 2. Instructor established mathematics goals to focus learning 3. Instructor implemented tasks that promoted reasoning and problem solving 	
<p>II – Atmosphere</p> <ol style="list-style-type: none"> 1. Instructor was enthusiastic about the subject matter 2. Students remained attentive and on-task 3. Instructor supported productive struggle in learning mathematics 4. Instructor treated students with respect 	
<p>III – Discourse</p> <ol style="list-style-type: none"> 1. Instructor posed purposeful questions 2. Instructor spoke clearly, audibly, and confidently 3. Instructor elicited and used evidence of student thinking 4. Instructor facilitated meaningful mathematical discourse 	
<p>IV - Mathematical Connections</p> <ol style="list-style-type: none"> 1. A variety of relevant illustrations/examples were seen 2. Instructor was knowledgeable about subject matter 3. Instructor made effective use of the board, visual aids, student work, and/or student presentations 4. Instructor and students used and connected mathematical representations 5. Class built procedural fluency from conceptual understanding 	

APPENDIX 5— LIBRARY RESOURCES REPORT²

The James E. Walker Library supports the Masters of Science in Mathematics through providing scholarly resources and the research expertise of the librarians and staff. This report aims primarily to describe the library's collection in general and specific collections germane to Mathematics Department that have been curated by the librarians. In addition, this report features services of the library that support student success.

Facts about James E. Walker Library Collection

The main collection, music collection, curriculum collection and special collections of the James E. Walker Library include 1,488,011 volumes of which 185,069 are bound volumes of serials, 67,710 are online government documents, and 560,417 are e-books. This collection also includes 18,104 streaming videos and 22,138 audio files. James E. Walker Library also provides over 390 databases, and over 13,679 print and 88,183 full text online journals for the MTSU community. The microtext area on the second floor contains 1,311,961 units of microtext.

In the academic year ending in 2010, Walker Library spent \$2,837,835 on library materials. In the academic year ending in 2015, the library spent \$3,892,021, an increase of 37% in five years. With this increase in spending, Walker Library has leveraged its material budget to subscribe to large bundled electronic resource collections from major publishers including Elsevier, Oxford, and Sage which substantially increases access for our students and faculty to scholarly material.

Walker Library has also acquired through perpetual licenses electronic archival monograph and ephemeral collections. It is not the nature of these collections to be priced based on disciplinary or Departmental content. In the academic year ending in 2014, the library was able to designate the costs of some of these collections in cases where the content was clearly associated with a few distinct disciplines within the traditional metric of expenditures.

Prior to the 2013 – 2014 academic year, library resources were requested by teaching faculty in the Mathematics Department. A faculty representative from the Mathematics Department forwarded recommended academic titles to Collection Management for ordering and purchase. Beginning in fall 2013, Walker Library shifted away from the traditional Department-based book allocation to having books shipped automatically to Walker Library that meet specific subject profiles for each Department (an approval plan). These approval plans have been tailored to the courses taught in that Department and the research interests of its faculty. The approval plan should result in decreased time required by faculty to select relevant material and increased quality and quantity of resources. Faculty can still request materials not received on approval.

² The library currently maintains more than 16,000 math holdings. A complete list as of Fall 2015 is on file in the Math Department office.

Math Content Provided by James E. Walker Library

Walker Library provides scholarly content to faculty and students through journals and serial publications, electronic databases, and monographs. The following sections describe these resources.

Journals: Over 13,679 print and 88,183 full text online journals are available at <http://qq5td7he6s.search.serialssolutions.com/?L=QQ5TD7HE6S&tab=JOURNALS>. The following list shows the Library's serial holdings to support the Masters in Science - Mathematics program by subject headings. The number of journals in that area is indicated in parenthesis. The headings below are hyperlinked to a listing of the journal titles within each category.

Mathematics

[Algebra \(90\)](#)

[Calculus \(38\)](#)

[Elementary Mathematics & Arithmetic \(8\)](#)

[Geometry \(40\)](#)

[Mathematical Statistics \(99\)](#)

[Mathematical Theory \(343\)](#)

[Mathematics - General \(240\)](#)

[Mathematics Teaching & Research \(55\)](#)

As mentioned previously, it has become impossible to fully quantify the amount that Walker Library spends for education journals. However, we can provide a list of journal titles for which we pay to receive subscribed access. In Appendix A, we list 28 journal titles in mathematics which received more than 20 full-text article downloads. The most highly used journal title was *Applied Mathematics and Computation*, published by Elsevier, with 280 full-text articles downloaded.

Electronic Databases

Over 390 databases are available to students and faculty at MTSU library. The majority of these may be accessed remotely from off campus as well as in the library and on campus. A complete listing is available on the library's web site at <http://libraryguides.mtsu.edu/databasesaz>.

The following selected electronic resources are from the Mathematics Research Guides, <http://libraryguides.mtsu.edu/content.php?pid=337388&sid=2759317>, which provides liaison contact information, chat boxes, journal, e-book and full catalog search boxes, as well as a collection of the best resources for Mathematics.

[Dissertations & Theses Full-text from ProQuest](#)

Index to dissertations and theses published in the United States with many in full-text.

[MathSciNet](#)

Comprehensive database covering the world's mathematical literature since 1940.

[SAGE Research Methods](#)

Over 100,000 pages of SAGE research methods books, journals, and reference material with advanced search features. Helpful resource for research design and methodology.

ScienceDirect

Indexing, abstracting, and full-text for journals in the sciences and social sciences. Includes: *Advances in applied mathematics, Applied Mathematics and Computation, Discrete Applied Mathematics, Computers & Mathematics with Applications, The Journal of Mathematical Behavior, and the Journal of Computational and Applied Mathematics*

Scopus

Abstracts and citations from peer-reviewed literature in Life Sciences, Medicine, Physical Sciences, Technology, Social Sciences and Arts & Humanities.

Web of Science - Science Citation Index

Indexing to leading journals in the sciences, with links to full-text

Monographs and Government Documents

Walker Library provides a variety of content to support student and faculty research including traditional print monographs on our shelves, electronic books that can be accessed through our catalog and/or library web interface and downloaded onto mobile devices, and government documents.

The Mathematic print collection spans the Dewey Decimal classification range from 510.00 to 519.99 and contains 7,721 volumes.

Dewey Range	Classification	Items
510	Mathematics	1,319
511	General principles	N/A
512	Algebra & number theory	1,347
513	Arithmetic	853
514	Topology	432
515	Analysis	N/A
516	Geometry	511
517	Not assigned or no longer used	N/A
518	Not assigned or no longer use	N/A
519	Probabilities & applied mathematics	3,529

Walker Library also provides over 700 electronic books on mathematics subjects that can be downloaded and read on mobile devices (or computers). A selection of highly used electronic

books (Ebooks) on Mathematics topics is illustrated in Appendix B. Because Walker Library is a Selective Federal Depository Library, the Government Documents Librarian has profiled MTSU to automatically receive many government documents online that can be accessed through Walker Library's catalog. Currently, 1,754 online government documents that deal primarily with Mathematics reside in the catalog. An example of this type of online government document is *Fueling innovation and discovery the mathematical sciences in the twenty-first century* published by the National Research Council.

Librarian Liaison support of the Mathematics Department

In fall 2013, James E. Walker Library assigned a librarian, Associate Professor, Mary Ellen Sloane, as a liaison to the College of Basic and Applied Sciences. In this role, Mary Ellen Sloane teaches specialized bibliographic instruction courses for both undergraduate and graduate students; meets with graduate students for individual research consultation; creates specialized and web-accessible subject guides for Mathematics topics; and works with both the Mathematics Department and the library's internal Information Resources Group to identify and acquire scholarly resources that best serve instruction and research.

Associate Professor Sloane maintains the following specialized subject research guide, <http://libraryguides.mtsu.edu/math>. These guides represent one-stop gateways to Walker Library's electronic and print holdings.

Other Library Services

Librarians are available to assist students in library research at the main floor Reference Desk. Students, faculty, and other library patrons may find a variety of helpful information and research aids at the Library Home Page at <http://library.mtsu.edu/>

Adaptive Technology

This center, located on the first floor, is equipped with special equipment designed to enhance the use of the library by those with disabilities, especially those with visual impairment.

Library Web Page <http://library.mtsu.edu/>

The library web page contains library information as well as links to subject resources in the library and on the Internet.

Ask-a-Librarian (James E. Walker Library homepage, menu option "Ask a Librarian.")

Library assistance is available at the Reference desk, online at E-mail a Librarian, <http://libanswers.mtsu.edu/>, or by telephone, 615-898-2817 (option 3), or text (Send a message to 265010. Start the message with our AIM screen name libmtsu. Example: libmtsu what r yr hrs?). Chat reference is also available on the Ask-A-Librarian webpage and is available during open library hours.

Library Instruction

Instruction classes on research materials available in the library and how to use them are available upon faculty request.

3D Printing

James E. Walker Library offers 3D printing to students for a nominal cost. More information about the 3D printing is available at <http://library.mtsu.edu/3dbrochure.pdf>.

Computers

Over 350 public PCs are located in the James E. Walker Library and priority is given to students performing class work. PCs are available on all of the Library's four floors. The Use of the computers is governed by the library's Information Technology Resources Policy. Printing is available from all public computers to dedicated laser printers on each floor. Walker Library also loans laptops to students. Students check out the laptop as they would check out a book. The laptops are network enabled and provide free printing.

Digital Media Studio

The Digital Media Studio, located on the 2nd floor of the James E. Walker Library, offers the latest digital tools and unique facilities to enable the exploration of rich digital media for learning experiences, collaboration and creative expression. The Digital Media Studio is a welcoming, collaborative space for users of all abilities, disciplines, levels and interests.

Distance Education <http://library.mtsu.edu/distance.php>

Distance Learners at MTSU are entitled to library resources equivalent to students in a traditional campus setting. Distance Education students have three options for obtaining library resources without traveling to campus: book delivery, E-books, and obtaining a TALC card to use a library at public college or university closer to the student's home. In addition to using the Library webpage to locate and obtain online articles, the Interlibrary Loan Office may scan the article and send the article to the student via email.

Interlibrary Loan

Journal articles and books may be obtained from other libraries for students and faculty. <http://library.mtsu.edu/ill/> Students and faculty may request from the Interlibrary loan librarian books or periodical articles from other libraries. Interlibrary loan services are free to students and most articles arrive within a few days.

Laptop

Wireless laptops, adapters, and Ethernet cables are available for checkout at the Technology Services desk. The laptops and adapters have been provided through student technology funds and, as such, are only available to currently enrolled MTSU students. The loan period per item is four hours and may be taken outside the library. Microsoft Office is installed on all of the laptops. Students may use these laptops to print documents via the library's printers.

Research Coach http://library.mtsu.edu/reference/res_coach.php

Faculty and students may set up individual appointments with librarians in order to receive in-depth research assistance in the selection and use of library resources and services.

Reserves

Reserve services support the instructional needs of university courses by allowing greater access to limited resources. Instructors' personal copies, photocopies, or library materials may be placed on reserve for varying loan periods. Furthermore, our electronic reserve service allows many materials on reserve to be electronically accessed using the University Library's Sierra online system.

Security

A security system has been installed for the safety of library users and the protection of the collection. Security cameras mounted throughout the library are monitored from the service desk. Motion detectors/sensors detect unauthorized personnel after closing hours. Panic buttons and alarms are located strategically in the building.

Tutorials and research help

Self-help and interactive tutorials for students to learn how to use the library, how to cite references and how to do research, etc. This information is located on the James E. Walker Library homepage, found at <http://library.mtsu.edu/index.php>.

Under the James E. Walker Library banner, there is an option for "Get Help."

Writing Center

The Margaret H. Ordoubadian University Writing Center provides a relaxed, yet professional atmosphere in which writers from across the curriculum can become more comfortable with processes of writing. The new location of the center is on the third floor of Walker Library. The primary goal is to foster independent writers who are capable of recognizing and capitalizing on their strengths as well as identifying and correcting their weaknesses.

Library Spaces

Combining space and services in an environment that inspires learning and interaction, the library building brings together the intellectual and social aspects of the institution in a beautiful facility. The James E. Walker Library is 250,000 gross square feet. The building is four floors above ground and is fully accessible to all persons with disabilities.

Carrels

Carrels are available for the convenience of graduate students doing research in the library.

Carrels can be requested by filling out the form at <http://library.mtsu.edu/services/gradcarrel0112.pdf>.

Group Zones

The 1st and 2nd floors, Group Study rooms on all floors, and room 446 on the 4th floor are designated as Group Zones. While individuals may work here, collaboration is encouraged and noise levels may be elevated.

Quiet Zones

The 3rd and 4th floors past the elevators, the Curriculum Collection on the 3rd floor, and room 264 on the 2nd floor are designated Quiet Zones. Talking, loud music, and cell phone use is restricted in these areas.

Group Study Rooms

The library has 37 group study rooms located on the 2nd, 3rd, 4th floors which can seat from 4 to 10 people. Each group study is equipped with a computer and whiteboard. Markers may be checked out at the Service Desk on the 1st floor. Nine of the group studies on the 4th floor may be reserved up to a week in advance.

Presentation Practice Rooms:

Two large group study rooms on the 2nd floor (248B and 201D) are equipped with large wall-mounted monitors and recording devices to allow students to practice and record presentations.

The Meeting Place, Room 248:

The Meeting Place is a semi-enclosed space large enough to accommodate 12 people. It features flexible furniture and movable whiteboard partitions. A laptop may be checked out from the Digital Media Studio and hooked up to a large screen wall-mounted monitor. Current MTSU students, faculty, and staff may reserve the Meeting Place for 3 hours at a time up to three months in advance.

Research Commons

The Research Commons on the first floor is a place to access, collaborate, create, and get help. Over 100 individual and team computer workstations, modern, flexible furnishings, and expert technical staff and research librarians are at your fingertips.

Synergy Spot

Located in the Research Commons on the 1st Floor, Synergy Spot features a wall-mounted large screen monitor attached to a PC running software capable of displaying several laptops at once to enable groups to share ideas.

The Lounge

Located on the 1st floor near the Technology Services Desk, The Lounge features soft seating, newspapers, popular magazines, and a collection of NY Times Bestsellers that you may check out for 2 weeks. The Lounge includes two ceiling mounted televisions displaying headline news.

Hours

The library is open one hundred and five hours a week:

Sunday 1:00 p.m. – 2:00 a.m.

Monday-Thursday 7:00 a.m.- 2:00 a.m.

Friday 7:00 a.m. - 6:00 p.m.

Saturday 10:00 a.m. - 6:00 p.m.

A Complete schedule of hours for fall semester 2015 is available on our website, <http://library.mtsu.edu/hours.php>.

Access to material located at other libraries:

Access Cards

Access cards to Vanderbilt University Libraries are available to graduate students at MTSU and to undergraduates working on a research project. Since Vanderbilt University Libraries are open to MTSU students during the day, students would only need an Access card for research during evening hours. Students should ask for request forms at the reference desk.

TALC Cards

This card may be obtained at the Circulation Desk. It allows MTSU students/faculty to check out materials from other UT libraries and TBR libraries. The user must have a current MTSU ID in order to check out materials.

APPENDIX 6—Criteria for Membership on the Graduate Faculty (October 2013)

Because appointment to the MTSU Graduate Faculty demands knowledge of current scholarship in the discipline and because continuing professional activity is a distinct part of a faculty member's work at this university, individuals seeking appointment to the graduate faculty of the university must provide evidence of scholarly productivity and engagement that meets the expectation of their discipline and the Graduate Council.

Only members of the MTSU Graduate Faculty are eligible to teach 5000/6000/7000 level graduate courses (including dual-listed UG/GR courses) or to serve on thesis or dissertation committees. Graduate faculty members in doctoral degree granting programs who wish to chair a dissertation committee must be endorsed for such service by their program and approved by the graduate dean.

Recognizing that variations in scholarship (research and creative activity) exist across disciplines and believing that scholars within a particular discipline are best positioned to know acceptable levels of scholarship for that discipline, the Graduate Council encourages each graduate program to develop procedures for review of applications and to establish minimum criteria for eligibility for appointment to graduate faculty appropriate for its discipline. Discipline specific criteria established by individual programs must be equivalent to or exceed the general criteria established by the Graduate Council and must be approved by the Graduate Council. As an alternative, programs may choose to use the general criteria for graduate faculty membership established by the Graduate Council.

Individual faculty applications must be reviewed and recommended by their program or Department and approved by the Graduate Council.

Graduate faculty membership is a 5-year renewable appointment. Renewals of membership are considered by the May meeting of the Graduate Council, to take effect on the following July 1st. The MTSU Graduate Council will also consider initial appointments and adjunct appointments at the first Graduate Council meetings of the fall and spring semesters.

Initial review of applications for graduate faculty membership occurs at the Department/program level. Applications and supporting documentation are reviewed and recommendations for appointment are forwarded to the Graduate Council.

The signed application form and attached documentation are forwarded to the College of Graduate Studies, Sam H. Ingram Building, Box 42, by April 1st. The Graduate Faculty and Program Review sub-committee review all applications and make recommendations to the Graduate Council which then makes recommendations to the dean of the College of Graduate Studies.

Persons accepted for graduate faculty membership receive notification from the College of Graduate Studies and their acceptance is noted in the Graduate Council minutes.

These criteria apply to tenured and tenure-track faculty in programs seeking appointment to the graduate faculty of Middle Tennessee State University and serving in programs that have not approved discipline-specific criteria.

Applicants for graduate faculty membership must hold the terminal degree in the teaching field. If the terminal degree is not a doctorate in the field, the application must include an approved MTSU Academic Preparation Certification (APC) verifying that the applicant meets SACSCOC criteria to teach at the graduate level. **If an APC form is necessary, it must go through the Provost's Office for signature first.**

Requirements for Consideration

Along with the **completed application**, applicants must include:

- **A recommendation letter -whether initial or reappointment-** from the Department chair (or the Graduate Program Director if in an interdisciplinary graduate program) which describes graduate teaching expertise. If the applicant has not previously taught graduate courses the letter must specifically address instructional expertise in the areas of anticipated instruction.
- **Evidence** of Research, Creative, or other Scholarly Activities. See below for specifics.

Note that it is not sufficient to simply provide a listing of activities. Examples of required documentation include first page of article, title page of book, printed program or review of performance, proceedings from meetings showing date and citation.

The applicant must meet one of the following criteria for Publications, Presentations or Ongoing Research, Creative, or Other Scholarly Activities.

A) Publications:

These require primary authorship or relevant co-authorship. If not yet in print, the faculty member may submit documented evidence of acceptance (i.e., in press).

Within the last five years the applicant must:

- have published a **scholarly book** requiring independent review; **OR**,
- have published **two** articles or essays in a peer-reviewed academic journal.

B) Presentations:

Presentations include artistic performances/presentations, product design, or the presentation of scholarly papers at professional meetings.

Within the last five years the applicant must:

- have created at least **two** original works for presentation/performance or **two** products designed and exhibited on an international, national, or regional level. The submitted activity must have been subject to external (off campus) review and be equivalent in contribution and rigor to the publication criteria defined above.
- have presented scholarly conference papers to at least **two** international or national conferences or **three** regional conferences. The submitted activity must have been subject to external (off campus) review and equivalent in contribution and rigor to the publication criteria defined above.

C) Ongoing Research, Creative, or Other Scholarly Activities:

Must be equivalent in contribution, rigor, and peer review status as publication criteria defined above as determined by the Graduate Council. The burden of evidence rests upon the applicant to prove that the contribution, rigor, and peer-reviewed status of the research, product design, creative activity or scholarly activity meet the criteria.

Must be recommended by the Graduate Council and approved by the Dean, College of Graduate Studies.

These are minimum standards in assessing graduate faculty membership. Individual programs may apply different standards by vote of the faculty of the program as long as they are equivalent or more stringent and are approved by the Graduate Council and the Dean of the College of Graduate Studies.

Adjunct Membership

Part-time adjunct faculty members and full-time faculty members on non-tenure track appointments at MTSU, and individuals who are not MTSU faculty members but have specific expertise pertinent to graduate programs may be recommended for membership on an adjunct basis. Adjunct membership must be renewed every three years. Adjunct members may not direct doctoral dissertations or Master's theses, but may serve as committee members/readers and may teach graduate courses.

Requirements for Consideration

If assigned to teach a graduate course the individual must hold the terminal degree in the teaching field. If the terminal degree is not a doctorate in the field, the application must include an approved MTSU Academic Preparation Certification (APC), approved by Academic Affairs verifying that the applicant meets SACS criteria to teach at the graduate level.

The applicant must also:

- Provide a **current vita** as evidence of qualifications to execute assignments successfully;
- Provide a **recommendation letter** from the Department chair (or the Graduate Program Director if in an interdisciplinary program);
- Be recommended by the Graduate Council;
- Be approved by the Dean, College of Graduate Studies.

For persons seeking adjunct graduate faculty membership for purposes other than instructing graduate courses,

- the Department chair (or Graduate Program Director if in an interdisciplinary program) should provide a letter stating specific expertise/qualifications related to the specific graduate faculty duties to be assigned.

College of Graduate Studies Criteria for Chairing a Doctoral Dissertation

These criteria apply to faculty holding graduate faculty membership that wish to chair a doctoral dissertation. Approval is granted for the purpose of chairing the dissertation committee of a specific student and ends with the graduation of the student. Likewise, if the graduate student fails to enroll in two consecutive semesters the approval must be reconsidered at the time of the student's reenrollment.

The request for approval to chair a dissertation is made at the time the Dissertation Advisory Committee Form is submitted and the doctoral student is advanced to candidacy.

Requirements for Consideration

Candidates for Dissertation chair must:

- hold the doctoral degree in the discipline and must be teaching in a doctoral degree granting Department or in interdisciplinary doctoral programs;

- be a member of the Graduate Faculty;
- be recommended by the Department chair (or the graduate program director if in an interdisciplinary degree program);
- have at least one year of experience in advising or teaching in a graduate program;
- have distinguished themselves in research and/or creative activity; thesis and/or dissertation direction; and graduate teaching. In certain instances, evidence of two of these three may be considered sufficient. Evidence of such distinction is indicated by a number of significant publications, presentations of original creative works, or products recognized at a national or international level; by successfully chairing prior theses or dissertations; and by excellence in graduate teaching. Note: conference presentation of scholarly papers does not meet the criteria for research and/or creative activity.
- be recommended by the Graduate Council and approved by the Dean of the College of Graduate Studies.

These are the minimum standards to chair a dissertation committee. Individual programs may apply different standards by vote of the faculty of the program as long as they are equivalent or more stringent and are approved by the Graduate Council and the Dean of the College of Graduate Studies.

APPENDIX 7 --- Graduate Exit Survey

MIDDLE TENNESSEE STATE UNIVERSITY
Department of Mathematical Sciences
MASTERS' DEGREE PROGRAM EXIT SURVEY

The purpose of this survey is to give you an opportunity to provide feedback about your graduate program experiences. Your feedback will be helpful in our efforts to improve the Graduate Programs at MTSU. Responses will be kept strictly confidential and individual responses will not be identified or reported. Please be candid. Your participation is appreciated. Thank you.

1. What year did you enter the Graduate Mathematics program at MTSU? _____
2. What year did you complete your degree? _____
3. Were you continuously enrolled in the program? YES____ NO____
4. Did you hold a GTA position? YES____ NO____
5. During your last year of study, which type of employment did you have? (*Check all that apply*)
____ Not employed
____ Employed full time ____ On Campus ____ Off Campus
____ Employed part time ____ On Campus ____ Off Campus
6. Do you plan on pursuing a terminal degree (PhD, EdD)? YES____ NO ____
7. If you answered YES to (6), have you been accepted into a degree program?
NO _____
YES _____ School _____
8. Do you currently have or have you recently been hired for a job relating to your degree?
NO _____
YES _____ Employer _____
Position _____
9. In the space provided, please comment on overall program quality. Include any suggestions you have for improvement. Feel free to use additional paper if necessary.

Please indicate your level of agreement or disagreement with each of the following statements.

1 – Strongly disagree 2 – Disagree 3 – Neutral 4 – Agree
 5 – Strongly Agree

	SD	D	N	A	SA
1. Faculty in my program held high expectations for my performance	1	2	3	4	5
2. My professors encouraged me to participate in professional organizations	1	2	3	4	5
3. The program supported my research or professional goals	1	2	3	4	5
4. The amount of coursework required seemed appropriate	1	2	3	4	5
5. The courses were relevant for my intended profession	1	2	3	4	5
6. Courses addressed current developments in my field	1	2	3	4	5
7. Opportunities to develop mentoring and/or collaborative relationships with faculty helped my intellectual development	1	2	3	4	5
8. The quality of the coursework helped foster a sense of intellectual community	1	2	3	4	5
9. The academic standards of the program helped my intellectual development	1	2	3	4	5
10. Library holdings were adequate for my needs	1	2	3	4	5
11. I feel well prepared to continue pursuing my professional goals	1	2	3	4	5
12. The program has helped me enhance my analytic reasoning skills	1	2	3	4	5
13. I received honest, useful feedback from faculty on my class performance	1	2	3	4	5

IF YOU HELD A GTA POSITION, PLEASE ANSWER THE FOLLOWING

14. I had the opportunity to develop teaching skills	1	2	3	4	5
15. I am confident in my teaching skills	1	2	3	4	5
16. I received faculty feedback on my teaching	1	2	3	4	5
17. I am confident in my ability to integrate technology into the classroom	1	2	3	4	5

IF YOU WROTE A MASTERS' THESIS, PLEASE ANSWER THE FOLLOWING

18. I received adequate faculty guidance in formulating a thesis research topic	1	2	3	4	5
19. I received adequate mentoring while completing my research topic	1	2	3	4	5