Institutional Effectiveness
2024-2025

Program: Mathematics MS
College and Department: College of Arts & Sciences, Mathematics
Contact: Michael Allen
Mission:
In alignment with Tennessee Tech's Vision and Mission statements, the Department of Mathematics will foster students' tenacity and analytical abilities through the offering of a wide variety of math courses, innovative teaching and research, and service, both public and institutional. As a central part of a STEM-infused comprehensive institution, the Department of Mathematics will create successful learners of mathematics in the university community and in the region. Learning opportunities will be provided to students of all disciplines to advance their understanding of mathematical concepts through effective use of analytical practices and critical thinking. More specifically, the Department will provide its majors with a thorough foundation in mathematics and the flexibility to prepare for a variety of careers through the opportunity to study multiple areas of mathematics.

Attach Curriculum Map (Educational Programs Only):
Here is the current curriculum map for the Master's in mathematics at Tennessee Tech. As one can see, the map leaves room for the student to pursue their own path but with the stipulation Algebra and Analysis are taken.

MS in MATH Curriculum Map				
	Courses & Degree Requirements			
Student Learning Outcomes	**MATH 6110 (3 cr hours of Algebra)**	**MATH 6410, 6310 or 6010 (3 cr hours of Analysis)**	**Minimum of 30 graduate credit hours in MATH**	**3 Required Sequences and passing 2 comprehensive exam or 2 Required Sequences & Thesis**
Students will demonstrate breadth of mathematical knowledge	**X**	**X**	**X**	**X**
Students will demonstrate depth of mathematical knowledge			**X**	**X**

Program Goal 1: Ideal Number of Graduate Students

Define Outcome:
The Mathematics Master's program will grow and continue to recruit and retain an optimal number of students who major in Math.

Assessment Methods:
The Department will track the number of students applying to, admitted to, and graduating from our Master's program.

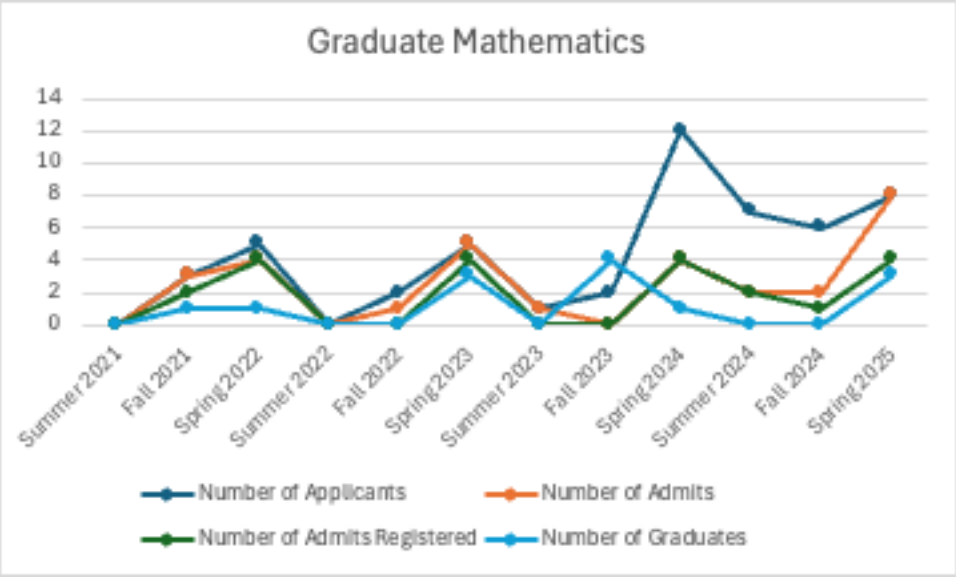
Criteria for Success (Thresholds for Assessment Methods):
The Department of Mathematics strives for a at least 15 applicants per year with at least 5 admitted per year and 5 graduated per year.

Link to 'Tech Tomorrow' Strategic Plan:
2.A Technology Infused Programs,2.B Research, Scholar, Intellect, and Creativity,3.A Efficiency and Effectiveness,4.C Network of Scholars

Results and Analysis:

Semester	Summer 2021	Fall 2021	Spring 2022	Summer 2022	Fall 2022	Spring 2023	Summer 2023	Fall 2023	Spring 2024	Summer 2024	Fall 2024	Spring 2025
Number of Applicants	0	3	5	0	2	5	1	2	12	7	6	18
Numbers of Admits	0	3	4	0	1	5	1	0	4	2	2	8
Number of Admits Registered	0	2	4	0	0	4	0	0	4	2	1	4
Number of Master's Graduates	0	1	1	0	0	3	0	4	1	0	0	3

Here is a quick graph of the table above:



Use of Results to Improve Outcomes:

The Department has been working on its recruiting efforts, and it shows. Applications are up, and all eight assistantships have been awarded this year and last. In fall 2024 two students were admitted, enrolled, and attended classes who were not on an assistantship. Unfortunately, they have withdrawn from the program. This coming fall, one student has enrolled who is also not on an assistantship.

The Department will continue to improve and refine its recruiting methods, which include digital and standard invitations to apply.

Program Goal 2: Extracurricular Activities

Define Outcome:
Mathematics graduate students will participate in extracurricular activities, like workshops, conferences and outreach events, related to mathematics.

Assessment Methods:
The Department will track the number and types of activities attended by our graduate students.

Criteria for Success (Thresholds for Assessment Methods):
The Department would like to see 50% or more of our graduate students participate in outreach, conferences, and other extracurricular activities related to their discipline.

Link to 'Tech Tomorrow' Strategic Plan:
2.B Research, Scholar, Intellect, and Creativity,4.C Network of Scholars

Results and Analysis:
Our graduate students assisted the Department in proctoring the Tennessee Math Teachers Association's annual middle and high school math contest held in April. One graduate student was an instructor with the week-long RAMP program put on by the College of Engineering prepping students to take the Accuplacer. Dr. Gayan Maduranga took two students to present at the 2024 Actuarial Research Conference held in Murfreesboro, Tennessee. Those two students, along with two undergraduates, presented posters at the University's 2025 Research and Creative Inquiry Day this past April.

Use of Results to Improve Outcomes:
Last year it was said the results need to be doubled and it did. To continue the trend faculty and graduate students will continue to be encouraged to plan activities beyond the classroom.

Student Learning Outcome 1: Knowledge of Graduate-Level Algebra and Analysis

Define Outcome:
All MS in Mathematics graduates will demonstrate knowledge of graduate-level Algebra and Analysis.

Assessment Methods:
The graduate advisor will track the percentage of students who answer correctly common questions given in their graduate exams.

Criteria for Success (Thresholds for Assessment Methods):
The Department will strive for a better than 75% pass rate on these common questions.

Link to 'Tech Tomorrow' Strategic Plan:
2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:
Our three graduates from the 2024-25 academic year demonstrated a breadth of knowledge of mathematics by completing Math 6110 Abstract Algebra and Math 6410 Real Analysis. After a discussion last year by the graduate faculty, a generic rubric was created and is now being used in all defenses/oral exams. A copy of this generic rubric is included here.

Three students answered Algebra and Analysis questions posed to them during their oral exams. Of the three, one was given "unsatisfactorily" on Analysis. This result combined with an "unsatisfactorily" on a question asked of her in statistics required a retake of her oral exam. The other two students received "satisfactorily" or "completely" on all their questions.

Attached Files: See Appendix 1

Use of Results to Improve Outcomes:
Last year, the results for the assessment of this outcome caused the graduate faculty to look more closely at this assessment and refine it and its use. The Math Department now has a rubric and a database of questions and results upon which to build.

Student Learning Outcome 2: Depth of Knowledge in an Area of Mathematics

Define Outcome:
All MS in Mathematics graduates will demonstrate a depth of knowledge in an area of mathematics.

Assessment Methods:
The Department will track the pass rate for the oral and comprehensive exams for their Master's students.

Criteria for Success (Thresholds for Assessment Methods):
The Department will strive for a 100% pass rate.

Link to 'Tech Tomorrow' Strategic Plan:
2.B Research, Scholar, Intellect, and Creativity

Results and Analysis:
Last year, the graduate faculty of the Department of Mathematics instituted a new rubric for oral exams which included two sections assessing the student's knowledge in their area of emphasis and their thesis. Three students defended their theses this past spring. All three passed their oral exams but only one received the highest mark or "completely" for their area of emphasis and thesis defense questions.

Attached Files: See Appendix 1

Use of Results to Improve Outcomes:
The use of the new rubric by the graduate faculty has made for a more comprehensive but less variable assessment. The graduate students have a better understanding of what is expected as well as the faculty. The assessment will continue to be used and refined. It will be recommended that a survey be given to members of the defense audience to determine a student's communication level and perceived competence mimicking the College of Engineering's approach.

Summative Evaluation:

For the first program goal on the ideal number of graduate students, it is apparent the Department needs to look at its recruiting plan. Although the increase in the number of applicants was promising, the number of domestic applications was significantly low.

The second program goal on extracurricular activities of our graduate students (and graduate faculty) had good results but needs to be formalized. A note about the change anticipated for this goal is given below.

The first student learning outcome on a student's knowledge of graduate-level algebra and analysis had a modest improvement with the graduate faculty creating a rubric for thesis defenses. Likewise, the algebra and analysis faculty created a list of questions, much like the statistics faculty created years ago from which the students could study and from which the faculty could ask questions.

The second student learning outcome also saw modest success because of the new rubric created by the graduate faculty. A note is likewise presented below on changes to be made to this assessment.

Assessment Plan Changes:

The second program goal on extracurricular activities will have a more formal assessment applied to it in the form of a targeted survey. This way a more accurate count can be made.

The second student learning outcome will be combined with the first student learning outcome because of the obvious correlation between the two outcomes and the common use of the new rubric. Along with the combining of the two learning goals it is recommended that a survey be created and given to members of the defense audience to determine a student's communication level and perceived competence mimicking the College of Engineering's approach. The combination of the two outcomes will take place a year from now.

List of Appendices:

Appendix 1: Rubric for Master's Defense/Oral Exams

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Rubric for Master's Defenses/Oral Exams

Name: _____

Student demonstrated knowledge of general graduate-level mathematics in

- ***Area 1 Outside Specialty***:

  Question(s) asked during oral exam:

  Student generally answered these questions

  ___ completely ___ satisfactorily ___ unsatisfactorily ___ not at all

- ***Area 2 Outside Specialty***:

  Question(s) asked during oral exam:

  Student generally answered these questions

  ___ completely ___ satisfactorily ___ unsatisfactorily ___ not at all

Appendix 1: Rubric for Master's Defenses/Oral Exams, cont.

Student demonstrated knowledge of his or her mathematical area of emphasis

- student explained the ideas contained in his or her thesis

  ___ completely ___ satisfactorily ___ unsatisfactorily ___ not at all

  Comments:

- student answered questions related to his or her thesis

  ___ completely ___ satisfactorily ___ unsatisfactorily ___ not at all

  Comments: