UNIT REPORT

Mathematics MS - Institutional Effectiveness Final Annual Report 2019

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Mathematics MS

Mission Statement of Math Department

Reporting Year:

Providing Department: Mathematics MS

Department/Unit Contact: Allan Mills

Mission/Vision/Goal Statement:

All undergraduate degree programs at Tennessee Tech require at least one course in mathematics and many require several courses. The Department of Mathematics provides a variety of general education courses, introductory and advanced undergraduate courses in support of STEM majors, and graduate-level courses for the MS in mathematics and other graduate programs.

As a central part of a STEM-infused comprehensive institution, the Department of Mathematics strives to create successful learners of the subject of mathematics in the university community and in the community where we live. Learning opportunities are provided to students of all disciplines to advance their understanding of mathematical concepts and their effective use of analytic practices and critical thinking as useful in their studies and everyday life. The departmental faculty conduct research in mathematics and as part of interdisciplinary teams and provide service to the department, college, University, and mathematical community.

The mission of the TTU Department of Mathematics is to promote the learning of mathematics through effective

teaching, research, and public service. Such learning opportunities are provided to students of all disciplines in support of the mission of the University.

New Academic Curriculum Map Item

Curriculum Mapping :

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**

Goal 1. Average at least 5 graduates per year

Define Goal:

The MS in Mathematics degree program will average at least 5 graduates per year

Intended Outcomes / Objectives:

Goal 2. Students will participate in extracurricular activities

Define Goal:

Mathematics graduate students will participate in extracurricular activities related to mathematics. These activities will include participation in the departmental Graduate Seminar and Teaching Seminar, presenting research, and the opportunity to attend lectures by guest speakers.

Intended Outcomes / Objectives:

Learning Outcome 1. Students will demonstrate breadth of mathematical knowledge

Define Goal:

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

Intended Outcomes / Objectives:

MS in Mathematics graduates will demonstrate knowledge of graduate-level Algebra and Analysis by earning grades of B or better in Math 6110-Abstract Algebra and a 6000-level course in Analysis (Math 6010-Functional Analysis, Math 6310-Complex Analysis, or Math 6410-Real Analysis).

Learning Outcome 2. Students will demonstrate in-depth knowledge of a selected area of mathematics

Define Goal:

Intended Outcomes / Objectives:

All MS in Mathematics graduates will demonstrate a depth of knowledge in an area of mathematics

Assessment of MS student breadth of knowledge

Goal/ Outcome/ Objective: Learning Outcome 1

Type of Tool: Other

Frequency of Assessment: each semester as needed as students complete the degree program

Rationale:

A student's knowledge of Algebra and Analysis is assessed by course grades in Math 6110-Abstract Algebra and the required 6000-level course in Analysis (one of Math 6010-Functional Analysis, Math 6310-Complex Analysis, or Math

6410-Real Analysis) and the course grades in the year-long course sequences on the student's program of study.

Threshold of Acceptability: Students should earn a grade of B or better in all classes

Assessment of MS student depth of knowledge

Goal/ Outcome/ Objective: Learning Outcome 2. Depth of Knowledge

Type of Tool:

Frequency of Assessment:

Rationale:

Non-thesis students' depth of knowledge is assessed by comprehensive exams covering 2 of the 3 year-long course sequences such students are required to take. The exams are prepared and scored by the instructors of the course sequences.

Threshold of Acceptability: A passing score on both comprehensive exams.

Thesis students' depth of knowledge is assessed by their written thesis and their oral thesis defense.

Threshold of Acceptability: A majority of thesis committee members assess the student as having passed the thesis defense and demonstrated understanding of the material in the thesis.

Assessment- Goal 1: Count of the number of MS in Mathematics graduates in the previous July 1-June 30 time period

Goal/ Outcome/ Objective: Program Goal 1

Type of Tool: Graduation Rate

Frequency of Assessment: annually

Rationale:

The number of students earning the MS in Mathematics in the previous year is determined and trends are tracked using a

5-year average of the number of graduates.

Threshold of Acceptability: Five-year running average of 5 graduates per year

Assessment-Goal 2: Count of the number of presentations by graduate students and guest speakers

Goal/ Outcome/ Objective: Program Goal 2

Type of Tool: Meeting Records
Survey

Frequency of Assessment: annually

Rationale:

The number of presentations during the previous year by graduate students (in the Graduate Seminar and Teaching Seminar, at Student Research Day, or at a conference) is counted. A count of the number of presentations by guest speakers is also made.

Threshold of Acceptability: Each graduate assistant should actively participate in the Teaching Seminar and present at least 1 talk in the Graduate Seminar.

Results - Goal 2: Graduate student participation in seminars

Goal/Objective/Outcome Number: Goal 2

Results:

One graduate student presented a research poster at a national conference.

The departmental Graduate Advisor arranged weekly meetings of the Graduate Seminar. The faculty typically present talks each week in the fall, while the graduate students present talks in the spring. All graduate assistants gave a talk in the Graduate Seminar. In addition, three students studying algebra regularly presented talks in an Algebra Seminar during the academic year.

The leader of the Teaching Seminar arranged for weekly meetings. All graduate teaching assistants participated in the Teaching Seminar including classroom visits to watch experienced instructors teaching lower division mathematics classes.

	Teaching Seminar		Graduate Seminar	
Academic Year	Graduate Student Presentations	Guest Presentations	Graduate Student Presentations	Guest Presentations
2012-2013	10	2	9	8
2013-2014	10	1	10	5
2014-2015	14	0	10	0
2015-2016	12	0	12	4
2016-2017	8	0	8	2
2017-2018	32	2	11	1
2018-2019	15	0	9	0

Attachments:

Results- Goal 1:Number of Graduates per Year

Goal/Objective/Outcome Number: Goal 1

Results:

The MS in MATH program graduated 3 students during the 2018-19 academic year which is below our target of graduating 5 students each academic year. For the most recent five academic years the program is averaging 5.6 graduates per year. We anticipate having 6 graduates for the upcoming 2019-20 academic year.

Number of Degrees Awarded July 1-June 30

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Male	2	2	5	1	4	7	2	1	2
Female	1	0	0	0	2	2	4	3	1
Total MS in MATH	3	2	5	1	6	9	6	4	3

Attachments:

Results: Learning Outcome 1-Breadth of Knowledge of Mathematics

Goal/Objective/Outcome Number: Learning Outcome 1

Results:

Each 2018-19 graduate demonstrated a breadth of knowledge of mathematics by completing Math 6110-Abstract Algebra and a 6000-level course in Analysis with a grade of B or better.

Attachments:

Results: Learning Outcome 2: Depth of Knowledge

Goal/Objective/Outcome Number:

Results:

Each 2018-19 graduate completed a thesis and demonstrated a depth of knowledge by defending his/her thesis and having it approved by an advisory committee. The attached file contains the rubric used by thesis committees to assess student mastery of thesis topic and the oral exam portion of the thesis defense.

Attachments: Attached Files

Master's Defense and Oral Exam rubric 2.pdf

Modification- Goal 1: Average at least 5 graduates per year

Goal/Objective/Outcome Number: Goal 1

Program Changes and Actions due to Results:

The MS program is graduating, on average, 5 students per year.

Although many of our students are graduates of the TTU BS in Mathematics program, some are from other institutions in the US and some are international students. In the upcoming academic year we plan to create a Graduate Student Handbook containing information that will be useful to incoming students. This should be particularly helpful to students new to TTU and also encourage outside students to apply to our program.

Link to Assessment:

Link to 'Tech Tomorrow' Strategic Plan: Efficiency and Effectiveness

Modification- Goal 2: Student participation in extracurricular activities

Goal/Objective/Outcome Number: Goal 2: Student participation in extracurricular activities

Program Changes and Actions due to Results:

The department's graduate assistants are involved in departmental seminars and have the opportunity to present research

at nearby conferences.

There were no talks given by visitors last academic year. We plan to increase the number of talks given by visitors in the upcoming academic year.

Link to Assessment:

Link to 'Tech Tomorrow' Strategic Plan: Experiential Learning

Modification- Learning Outcome 1- Student breadth of mathematics knowledge

Goal/Objective/Outcome Number: Learning Outcome 1

Program Changes and Actions due to Results:

No changes necessary at this time.

Link to Assessment:

All graduates earned grades of B or better in the 6000-level Analysis and Algebra courses on their programs of study. The mathematics graduate faculty are satisfied that students completing the MS in mathematics program are demonstrating knowledge of the basic algebra and analysis topics that all graduate students should understand.

Link to 'Tech Tomorrow' Strategic Plan: Research, Scholar, Intellect, and Creativity
Programs, Certificates, and Training

Modification: Learning Outcome 2: Depth of Knowledge

Goal/Objective/Outcome Number: Learning Outcome 2: Depth of Knowledge

Program Changes and Actions due to Results:

The Graduate Faculty will consider ways to improve the thesis defense rubric.

Link to Assessment:

The faculty believe our assessment rubric can be improved to better assess student performance in the thesis defense.

Link to 'Tech Tomorrow' Strategic Plan: Experiential Learning

Research, Scholar, Intellect, and Creativity