

Academic Year: 2013-2014

Program/Department: B.S. in Mathematics

College: Arts and Sciences

Submission Date: June 27, 2014

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I. Program/Department Mission:

The central and fundamental mission of the University is two-fold: to offer a strong academic program to its students and to preserve and enhance knowledge - knowledge contained in its library and in the minds and intellects of its faculty. The Department of Mathematics acts to carry out its share of that mission through course offerings and activities in its disciplines designed to stimulate clear and logical thinking, strengthen the ability to understand and formulate quantitative relationships using mathematics, foster appreciation of the contributions made to our civilization by mathematics, illustrate current and potential uses of mathematics in our technological world, and develop fluency in mathematical skills. It is the mission of the Department:

- (1) To supply knowledge and appreciation of mathematics at a level commensurate with the cultural training expected of all university students;
- (2) To prepare its majors to pursue graduate work in mathematics, to seek employment as mathematicians, or to teach mathematics at a level consistent with their training;
- (3) To support the educational programs of other units of the University at both the undergraduate and graduate level;
- (4) To provide both personal and professional advisement for its majors in the context of the mathematical discipline;
- (5) To serve the University and the larger community by providing, for example, committee representation, off-campus instruction, as needed, and assistance with services designed to support the educational objectives of the local school systems such as science fairs, mathematics contests, science bowl, career day, and similar events;
- (6) To conduct research in pure and applied mathematics and statistics and prepare scholarly papers for publication or oral presentation; and
- (7) To update its curricula regularly to reflect developments in mathematics and changes in the needs of its constituencies.

II. Program Goals and Student Learning Outcomes:

Program Goals:

1. The undergraduate degree program will average at least 10 graduates per year.
2. Increase the use of technology in mathematics classes.
3. Improve initial math course placement for incoming freshmen and transfer/international students by developing a placement procedure involving a mathematics test.

4. Contribute to the mission of the Center for Teaching and Learning in Science, Technology, Engineering, and Mathematics (STEM) by having faculty members involved in its activities.

Student Learning Outcomes:

1. Students graduating in mathematics will demonstrate an understanding of mathematics by having 50% of graduates score at or above the 75th percentile on the ETS Major Field Test in Mathematics.
2. All students graduating from the University will be “mathematically literate” in, and able to apply their knowledge from, mathematics courses in their curricula.

III. Assessments

Assessments for Program Goals

- a) **Count Mathematics graduates in the previous July 1-June 30 time period.** (Conducted each August)-Program Goal 1.
- b) **Faculty Annual Report.** (Submitted each spring semester)-Program Goal 2. As part of their annual effort reports each faculty member lists the type of technology used and STEM Center activities

Assessments for Student Learning Outcomes

- a) **ETS Major Field Test in Mathematics** (Administered each fall and spring semester)- Student Learning Outcome 1.
- b) **National Survey of Student Engagement** (Given Spring semesters 2006, 2009, 2011, 2014)-Student Learning Outcome 2.
- c) **Praxis II Math Content Knowledge** (Administered each fall and spring semester)-Student Learning Outcome 2.

IV. Rationale for Outcomes and Assessments

- a) **Count Mathematics graduates** (Conducted each August)-Program Goal 1 - Each August the number of students earning the BS in Mathematics in the previous year is determined and trends are tracked using a 5-year average of the number of graduates.
- b) **Faculty Annual Report.** (Submitted each spring semester)-Program Goal 2. As part of their annual report on their efforts in teaching, research, and service, full-time members of the mathematics faculty report on their use of technology and activities involving the STEM Center.
- c) **ETS Major Field Test in Mathematics** (Administered each fall and spring semester) -Student Learning Outcome 1 - The ETS Major Field Test in Mathematics is designed to measure student performance so that meaningful comparisons between similar schools throughout the country can be made. All

graduating mathematics students take the ETS Major Field Test in Mathematics during their final semester at TTU.

- d) **National Survey of Student Engagement** (Given Spring semesters 2006, 2009, 2011, 2014) - Student Learning Outcome 3: Relevant questions on the National Survey of Student Engagement (NSSE) will assess students' confidence in their mathematical abilities.
- e) **Praxis II Math Content Knowledge** (Given each fall and spring semester). The Praxis Content Knowledge test in Mathematics is designed to assess the mathematical knowledge and competencies necessary for a beginning teacher of secondary school mathematics.

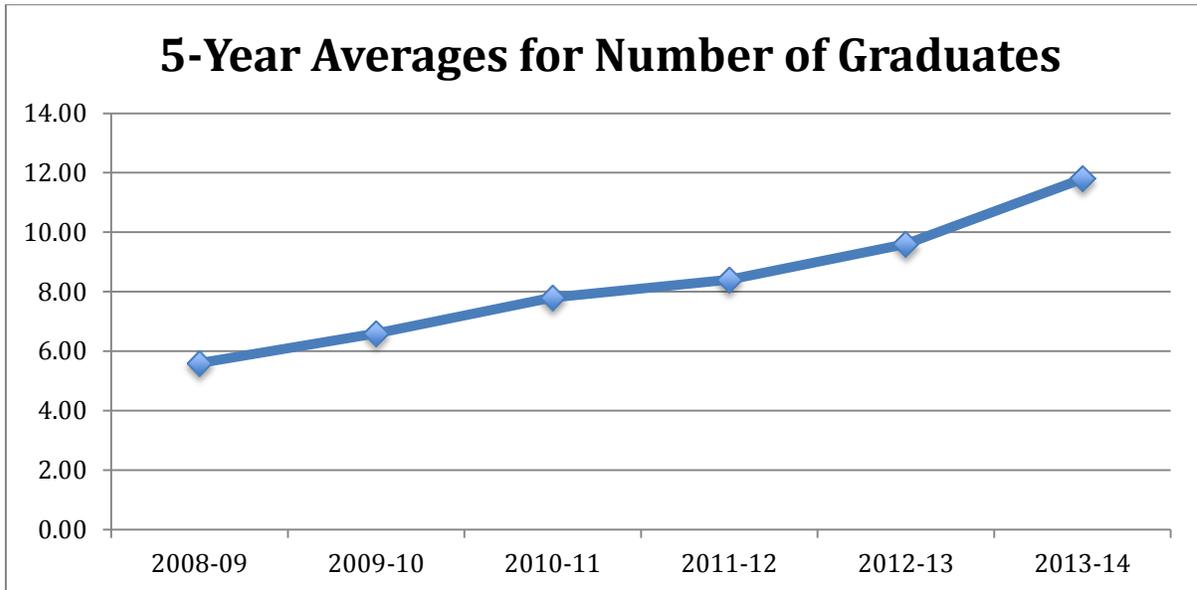
V. Results

Program Goal 1: Table 1 below displays the number of BS in Mathematics graduates for each of the previous 10 years.

Table 1. Number of TTU BS in Mathematics Graduates

Year	Men	Women	Total Number of Graduates
2004-2005	2	1	3
2005-2006	3	2	5
2006-2007	4	1	5
2007-2008	4	2	6
2008-2009	8	1	9
2009-2010	6	2	8
2010-2011	8	3	11
2011-2012	6	2	8
2012-2013	9	3	12
2013-2014	12	8	20

The next chart shows the trend of the 5-year running average of the number of graduates from the BS in Mathematics program. The number of graduates per year has increased significantly over the last 10 years and the total of 20 graduates in 2013-14 is the most for the program since 1969.



Program Goal 2: Mathematics faculty members have increased their use of instructional technology in recent years. All of our classrooms are equipped with projectors. At least ten faculty members have tablets and use them as presentation tools or to archive lectures for their courses.

In fall 2012 the department developed a form for faculty to report their instructional uses of technology each year. Table 2 below shows the number of sections taught by full-time mathematics in which instructional technology is used. Since many adjuncts and graduate assistants incorporate instructional technology in their courses, the counts below underreport the overall use of instructional technology in mathematics classes at TTU.

Table 2. Number of Course Sections Taught by Full-Time Faculty Using Instructional Technology

	2012	2013
Class Instruction		
iLearn	44	25
Automated Homework	17	20
Tablet-project lectures	35	25
Archive lectures	10	13
Required software for student use		
Maple/Maxima/Mathematica	7	0
Matlab	3	0
R	5	12
SAS	3	3
Excel	15	7
DPGraph	2	0

Program Goal 3: In summer 2012 a faculty member researched the COMPASS exam used by the TTU Learning Support unit to determine a student’s eligibility for credit-bearing mathematics classes. He was able to format the testing system to allow students to continue to more advanced assessment problems. Using a concordance between COMPASS (Computer-adapted Placement Assessment and Support Services) test scores and ACT MATH scores, a placement rubric was established that allowed us to place incoming students (without an ACT score) into an introductory mathematics class based on their COMPASS scores. The placement rubric was revised for summer 2014. During the 2013-14 academic year the Math Department obtained approval to implement ACT Math Subscore prerequisites for Math 1710-Precalculus I, Math 1720-Precalculus II, and Math 1730-Precalculus effective fall 2014.

Program Goal 4: During the 2013 calendar year two faculty members were involved in Faculty Development Workshops at the STEM Center; four participated in an outreach activity, and four were involved in a grant run through the STEM Center.

Learning Outcome 1:

The ETS Major Field Test in Mathematics is designed to measure student performance so that meaningful comparisons between similar schools throughout the country can be made. Table 3 below displays the average scores of TTU students who took the Major Field Test in Mathematics in the last five academic years. TTU’s average student score is compared to the average score for students at other institutions by the percentiles shown. In particular in 2013-14 the average of our student’s scores was at the 67th percentile of a ranked list of average student scores of all institutions using the exam. One of the eight students included in the 2011-12 data did not complete all degree requirements and failed to graduate.

Table 3. Average Scores on ETS Major Field Test in Mathematics

	National Average	Number of TTU Math Students Taking the Test	TTU Average	Percentile of TTU Average
2007-08	155.5	4	165	85th
2008-09	155.9	6	166.5	90th
2009-10	156	5	163.6	80th
2010-11	156	9	169	94th
2011-12	156	8	171.6	96 th
2012-13	156	11	160.7	74 th
2013-14	156.4	19	161.2	67 th

The next table shows the percentage of TTU students scoring at or above the 75th percentile on the Major Field Test in Mathematics.

Table 4. Percentage of TTU Students Scoring at or above the 75th Percentile on ETS Major Field Test in Mathematics

	Number of TTU Students Taking the Test	Percentage of TTU Students Scoring at or Above 75 th Percentile
2009-10	5	40 %
2010-11	9	55.6%
2011-12	8	50%
2012-13	11	36%
2013-14	6	30%

Learning Outcome 2:

Data from the 2009 and 2011 National Study of Student Engagement (NSSE) comparing the TTU average to the averages of all Tennessee public universities and our Carnegie peers on a question related to the learning outcome is shown in the Table 5. Freshman and senior students were asked to what extent their experience at college had contributed to their ability to analyze quantitative data and the comparison of the average responses indicates that TTU students have a higher regard for their improvement in handling quantitative data than their peers at other institutions.

Table 5. TTU Student Response Averages on NSSE Questions Related to Ability to handle Quantitative Data

	2009 TTU	2009 THEC	2009 Carnegie	2011 TTU	2011 THEC	2011 Carnegie
Freshmen	2.89	2.99	2.93	2.99	2.97	2.98
Seniors	3.17	3.14	3.08	3.18	3.12	3.10

Scale: 1= Very Little; 2= Some; 3= Quite a Bit; 4= Very Much

The Praxis II test is used to measure the Math Department’s instructional effectiveness for the TTU students who are pursuing degrees in secondary education-mathematics. The Praxis II Subject Assessments measure knowledge of specific subjects that K-12 educators will teach, as well as general and subject-specific teaching skills. The Mathematics Subject Assessment data for TTU graduates is shown in the table below. Almost all students who completed the secondary education program passed the exam, but some students required multiple test attempts.

Table 6. Pass Rate of TTU Students on Praxis II Math Content Knowledge Test

Academic Year	2012 - 2013	2013 - 2014
Number of Test Takers	5	8
Pass Rate for First Attempt	4/5 or 80%	7/8 or 87.5%
Final Pass Rate for Licensure	5/5 or 100%	8/8 or 100%

VI. Modifications and Continuing Improvement: Program Changes due to Assessments

Program Goal 1: The undergraduate degree program will average at least 10 graduates per year.

No changes are needed. The number of graduates per year has increased significantly over the last 5 years.

The department has been carefully monitoring its number of mathematics majors and number of graduates and has made adjustments to its curriculum to better accommodate transfer students and students interested in pursuing two undergraduate degrees.

Program Goal 2: Increase the use of technology in mathematics classes.

No changes are needed.

Program Goal 3: Improve initial math course placement for incoming freshmen and transfer/international students by developing a placement procedure involving a mathematics test.

The departmental efforts to improve placement has involved analysis of student success rates (ABC vs. DFW) in introductory classes. That analysis prompted the department to propose ACT Math Subscore prerequisites for Math 1710-Precalculus I, Math 1720-Precalculus II, and Math 1730-Precalculus. The proposal was approved by all relevant curriculum committees during the 2013-14 academic year and the prerequisites become effective fall 2014.

Program Goal 4: Contribute to the mission of the Center for Teaching and Learning in Science, Technology, Engineering, and Mathematics (STEM) by having faculty members involved in its activities.

No change is needed.

Student Learning Outcomes:

1. Students graduating in mathematics will demonstrate an understanding of mathematics by having 50% of graduates score at or above the 75th percentile on the ETS Major Field Test in Mathematics.

The department will consider revising this goal. The current goal statement places emphasis on the better half of our graduating seniors and this might not be appropriate as we care about the success of all of our students.

2. All students graduating from the University will be “mathematically literate” in, and able to apply their knowledge from, mathematics courses in their curricula.

No changes are needed. The data from the NSSE indicate that TTU students believe their quantitative skills have improved during their studies. The Praxis Test data show that TTU mathematics education majors have the content knowledge needed to be successful high school math teachers.