

**Texas A&M International University  
Annual Institutional Effectiveness Review (AIER)  
for Academic Programs**

**Program: Bachelor of Science with a Major in Mathematics**

**Assessment Period Covered: March 1, 2008 to January 31, 2009**

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**The Annual Institutional Effectiveness Review for Academic Programs is directed at Goal 1: Academics of the Texas A&M International University 2006-2010 Strategic Plan:**

Develop, maintain, assess, and improve academic programs, administrative/educational support services and student services, to admit, retain, and graduate students who achieve established learning outcomes designed to prepare them for success in their chosen careers.

**Institutional Mission**

Texas A&M International University, a Member of The Texas A&M University System, prepares students for leadership roles in their chosen profession in an increasingly complex, culturally diverse state, national, and global society ... Through instruction, faculty and student research, and public service, Texas A&M International University embodies a strategic point of delivery for well-defined programs and services that improve the quality of life for citizens of the border region, the State of Texas, and national and international communities.

**Academic Program Mission**

The faculty and staff of the Department of Mathematical and Physical Sciences are committed to excellence in teaching, research, service, and outreach. The programs within the Department lead to discovery, analysis, and dissemination of the knowledge of astronomy, computer science, engineering, mathematics, physics, and statistics. The Department provides a foundation in its disciplines for all graduate and undergraduate students as well as for teacher certification programs for mathematics and physical sciences majors. Our goals are to equip the graduates with the tools necessary to fully participate in a technological society and competitive global environment. The Department is committed to:

- Transmit ideas and knowledge pertaining to disciplines within the Department through teaching, including active learning, and related activities.

- Contribute to the advancement of the disciplines within the Department through quality research and sponsored projects.
- Utilize the Department's resources to serve the University and community.
- Serve as a resource of knowledge and pedagogy of the disciplines within the Department for the benefit of the University and community through outreach activities.

**Provide summary of the last cycle's use of results and changes implemented**

*Program faculty should evaluate the former cycle. This statement should specify if the outcomes addressed were a continuation of previous ones, new outcomes, or modified versions of previous outcomes. In addition, the statement should include a concise analysis of the assessment data collected during the previous year, a brief explanation of actions taken to address specific outcomes, an evaluation of how these actions contributed to the improvement of the program, and any recommendations formulated. Assessment data—including actual samples of student work—must be viewed and discussed by program faculty during this process.*

The Department of Mathematical and Physical Sciences worked last year in improving all of programs, and continues to do so this year. For the **Bachelor of Science with a Major in Mathematics** program, a reduction in the number of credit required was motivated by the need of reducing our program to 120 SCH. Our program was reduced to 120 SCH (from 123 SCH). The reduction was done by reducing the number of elective 4000 level credits in Mathematics.

The faculty of the program also developed last year a list of 5 learning outcomes for this program. They are summarized in this document. We worked very hard in agreeing to these outcomes and as a result this year we are working on restructuring MATH 2371, Communication in Mathematics, to meet the goals of this outcome. We have expanded the scope of this course to include oral presentations as well as a paper on ethics. This is reflected in the outcomes we are measuring this year.

**Selected list of program-level intended student learning outcomes** (*It is recommended that programs rotate through their entire set of outcomes over a multi-year period. Programs may focus on one or two outcomes each year, as deemed appropriate*).

1. Students will be able to communicate effectively in written and oral forms, work successfully in teams, and understand ethical responsibilities.
2. Students will be able to think critically and be prepared for life-long learning.
3. Students will be able to continue graduate studies in Mathematics Education or related field.
4. Students will have a working understanding of the major disciplines in Mathematics, including Algebra, Analysis, Geometry/Topology, and Probability/Statistics. Students will also have the ability to read and write proofs and a working knowledge of mathematics software tools.
5. Students will be able to complete a written project, under the supervision of a faculty member, in an area of Mathematics chosen from Algebra, Analysis, Geometry/Topology, or Probability/Statistics.

## Section I: Planning and Implementation

**Outcome(s):** *Identify the outcome(s) that will be focused upon this year.*

1. Students will be able to communicate effectively in written and oral forms, work successfully in teams, and understand ethical responsibilities.

**Please indicate if the outcome(s) is (are) related to writing (QEP).**

**Methods of assessment to be used:** *The explanation should identify and describe the type of assessment(s) that will be used (e.g., survey, questionnaire, observation instrument, test, rubric to evaluate performance, standardized examination, action research, interviews, etc.), who will provide the information, and how the data will be obtained.*

The course MATH 2371, Communication in Mathematics, will be used to compile data. Papers from the students will be collected and graded using the “Discipline Specific” part of the QEP rubric. Students will also write an essay about ethics, and give at least one oral presentation in the course. A rubric to evaluate oral presentations has been developed, and is submitted together with this report.

**Indicate when assessment(s) will take place:**

All items listed above will be assessed as part of the course, and therefore different areas will be assessed throughout the Fall 2008 semester.

**Criteria/Benchmark(s):** *Specify, if deemed appropriate to assess outcome(s). Criteria/ benchmark(s) may be optional, especially if qualitative measures are used for data collection.*

100% of the students in this degree program will receive at least a grade of 3 in their paper using the QEP rubric. 100% of the students will receive a “B” in their paper about ethics, and 100% will obtain at least a grade 3 in the rubric for oral presentations.

**Outcome(s):** *Identify the outcome(s) that will be focused upon this year.*

2. Students will be able to think critically and be prepared for life-long learning.

**Please indicate if the outcome(s) is (are) related to writing (QEP).**

**Methods of assessment to be used:** *The explanation should identify and describe the type of assessment(s) that will be used (e.g., survey, questionnaire, observation instrument, test, rubric to evaluate performance, standardized examination, action research, interviews, etc.), who will provide the information, and how the data will be obtained.*

Graduating seniors will be asked to take part in pilot program to take the Major Field Test in Mathematics by ETS at the end of their last semester.

**Indicate when assessment(s) will take place:**

Annual

**Criteria/Benchmark(s):** Specify, if deemed appropriate to assess outcome(s). Criteria/ benchmark(s) may be optional, especially if qualitative measures are used for data collection.

70% of the students taking the standardized test will score at or above the national 50<sup>th</sup> percentile.

**Section II: Analysis of Results**

**What were the results attained?** Describe the primary results or findings from your analysis of the information collected. This section should include an explanation of any strength(s) or weakness(es) of the program suggested by the results.

This year the Assessment Committee decided to assess two outcomes related to this degree. The following tables show the results relevant to each assessed item. The report includes all data collected, hence some differences may be found on the amount of available data for each table. In cases where a numerical score was used in this report, the following translation was used: A = 4.0, B = 3.0, C = 2.0 and F = 0. Each entry in the table shows the average of the Assessment Committee members in each category using this scale.

**Outcome 1**

Mathematical Writing Assignment	
Major	Score
BS MATH	1
BS MATH	2

Ethics Writing Assignment	
Major	Grade
BS MATH	A
BS MATH	A

Oral Presentation Assessment Results								
	Organization	Conveyed Point	Content Knowledge	Visuals	Mechanics	Delivery	Use of Notes	Average
<b>1</b>	2.7	1.7	1	3.3	3.7	3.7	2.7	<b>2.7</b>
<b>2</b>	2.3	2.7	2	2.3	2.3	2.7	2	<b>2.3</b>
<b>Average</b>	<b>2.5</b>	<b>2.2</b>	<b>1.5</b>	<b>2.8</b>	<b>3</b>	<b>3.2</b>	<b>2.4</b>	<b>2.5</b>

The table entitled “Mathematical Writing Assignment” shows that no student reached an average of 3 in this category. While this is below the targeted benchmark, it is a sign of several issues that the Assessment Committee together with faculty have discussed. It was seen that students have not mastered a level of communication in English that is good enough to write properly in English. This affects their level of communication at the technical level. Even though this issue was not part of the grading process, it is clear that students at this level have not mastered a proper way to communicate in English, even at the non-technical level.

Another issue raised by faculty, was that the use of the “discipline specific” part of the QEP rubric may not be appropriate for students at this level. A typical student that would take this course is a *sophomore* student that has complete ENGL 1301 and ENGL 1302, who has some training in Mathematics. The QEP rubric, however, is designed to measure a level of achievement in *graduating seniors*. Since this is the first course where students are learning technical writing, we believe this should also amount for a lower than expected scores in their papers.

The table entitled “Ethics Writing Assignment” shows the results of the assignment on Ethics. In this case 2 out of 2 students (100%) reached the intended goal. This number meets our benchmark. Students were given to read a sample paper in their discipline and were asked to read and report in the paper.

The table entitled “Oral Presentation Assessment Results” shows the results of the assessment of several in-class presentations of students in MATH 2371. In this case, no student reached the goal. While this is below our targeted benchmark, we believe it is due to the fact that students did not have an opportunity to practice their talk in front of an audience and receive feedback on it (from faculty or other peers), in preparation for this presentation, and were not aware of the rubric that would be used to evaluate their presentation. Students need to receive a set of guidelines that should follow when they are about to give a presentation, and this was not provided.

### Outcome 2

The following table shows the results of the students that took the Major Field Test in Mathematics.

Major Field Test Results for 2008	
Major	Score
BS Mathematics	123
BS Mathematics	161
<b>Average</b>	<b>142</b>

The first student falls below the 50 percentile, while the second student falls in the 83 percentile. Only one student reached the benchmark for this degree. While in this assessment cycle students graduating from this degree were below the benchmark, in order to assure that better results will be obtained in future cycles, the Department of Mathematical and Physical Sciences will take some measures to be described later.

The data available from 2003 to 2007 indicates that 50% of the students that graduate in this major reach the 50% percentile mark in this exam. This result shows that the trend has not changed this year.

**What were the conclusions reached?** *Should include a brief description of the procedure used for reaching the conclusion(s) based on the evidence collected and describe the process used to disseminate the information to other individuals. For example, if the discussion took place during the annual spring retreat, include a summary from those deliberations using the Meeting Minutes template found at <http://www.tamtu.edu/integrate/docs/Minutes-Template.doc>. Once completed, submit the minutes to [assessment@tamtu.edu](mailto:assessment@tamtu.edu).*

Information on the results of the assessment was disseminated in writing to all program faculty. A copy of this report was shared electronically with the Chair of the Department, members of the Assessment Committee and program faculty as listed above. Faculty was encouraged to give feedback on the report, and if they wanted to make any changes to the report, to send their observations. No further comments on the result of the assessment, other than those cited above or below, were received. Faculty were told that no feedback from their part would amount to agreement with the report, therefore this report is sent as agreed by the Assessment Committee and the program faculty for this major.

**Describe the action plan formulated. (The plan may be multi-year in nature.)** *Based on the conclusion(s), describe the action plan to be implemented to improve or maintain student learning, including a timeline for implementation.*

The actions to be taken for each outcome are outlined below:

### **Outcome 1.**

In regards to the outcome on “written paper assignment”, students will be asked to attend the writing center, prior to turning any paper, to receive feedback on their writings at a non-technical level; faculty may revise and adapt the rubric to take into account that these papers are being written by sophomores and not graduating senior, to adjust to a different level of expectation; possibly a different benchmark may be used to account for what is satisfactory writing at this level; and finally, students will be given the opportunity to write several versions of their paper before it is evaluated by the Assessment Committee. The idea in this case is that students will be able to revise their paper and learn from the comments given by the instructor, as they improve their writing skills in this course.

In regards to the outcome on “Ethics Writing Assignment”, students will be provided with a sample paper on ethics that relates to their major and will be asked to research for another one related to their major, and report on these papers. We believe this will work better because students in that course that reported on ethics in their major obtained an “A” when a sample paper was provided.

In regards to the outcome on “Oral Presentation”, students will be given an opportunity to practice their presentations in front of their peers and faculty member teaching MATH 2371, who will provide feedback. Students will also receive a guideline for giving presentations, as well as a copy of the rubric to be used to evaluate their presentation.

All the changes listed above will be implemented in the Fall 2009 semester.

### **Outcome 2**

In regards to the results of the Major Field Test we will be working in understanding better the relationship between the contents of the exam and the contents of our required and elective courses. This is not so that we can prepare our students for the exam, but to understand better if the full result of the exam is appropriate, or if we need to research a better way to assess this degree, or to use sub-scores of the test, that are better related to the content of our courses. Unfortunately it is not possible to predict what will happen after this, since it is not possible to anticipate the result of this search, but we believe that the results of this search could either recommend that we give students a pre-test, since all they need is more familiarity with the test environment, or could decide to reform some courses that may not be preparing the students for the requirements of the exam. Nevertheless, we expect the first phase of this project to be completed by the end of Fall 2009.

### Section III: Resources

**Resource(s) to implement action plan:** *Describe the resources that will be needed to implement the action plan. Also indicate if the resources are currently available, or if additional funds will be needed to obtain these resources.*

**Funding**

- New Resources Required
- Reallocation of current funds

**Physical**

- New or reallocated space

**Other**

- Primarily faculty/staff time
- University/rule procedure change only

**Provide a narrative description and justification for requested resources (include linkage to Strategic Plan)**

N/A

**Identify proposed outcomes for the next assessment cycle:**

*Continuation of present outcome(s) – (Indicate reason for continuation):*

We will continue to attempt to assess the same outcomes, since these are one of the most important steps that a student must go through in this program.

*New Outcome(s) – (List outcomes below):*

N/A

*Modification of present outcome(s) – (Indicate reason for modification):*

N/A