**UNIVERSITY ASSESSMENT COMMITTEE**
**Feedback to Academic Departments on Assessment Activities Reported in _FY13__ Annual Reports**
**UNDERGRADUATE PROGRAMS**

**DEPARTMENT____Mathematics_____DATE___April 14, 2014_____**

**PROGRAM(S) COVERED IN REVIEW _____Bachelor of Science (BS)_____**

**COMMITTEE MEMBER(S) CONDUCTING REVIEW Deborah Worley, Bradley Myers, Kyle Thorson**

**1. STUDENT LEARNING GOALS**

- Were any goals referenced? YES_X___ NO_____ QUALIFIED Y/N ___
- If so, were goals well articulated? YES____ NO_____ QUALIFIED Y/N _X__
- Do goals address student learning? YES_X___ NO_____ QUALIFIED Y/N ___

***Comments:***
*The 2012 Assessment Plan includes six student learning goals. Some of the language is vague ("develop an appreciation for…", "develop an awareness of …"). However, two of the student learning goals are more specific, listing objectives such as "Students will be able to read and understand proofs", "Students will be able to write elementary proofs", and "Students will realize when a proof is called for".*

In addition to the program goals, please also consider UND's institutional and Essential Studies goals for student learning (shown in alignment within parentheses) and identify which goals are similar to program goals.

___X____ 1 Communication – written or oral ("able to write and speak in various settings with a sense of purpose/audience")
___X____ 2 Thinking and reasoning – critical thinking (or "be intellectually curious"; analyze, synthesize, evaluate)
_____ 3 Thinking and reasoning – creative thinking (or "be intellectually creative"; explore, discover, engage)
___X____ 4 Thinking and reasoning – quantitative reasoning ("apply empirical data…analyze graphical information")
_____ 5 Information literacy ("be able to access and evaluate…for effective, efficient, and ethical use")
_____ 6 Diversity ("demonstrate understanding of diversity and use that understanding…")
_____ 7 Lifelong learning ("commit themselves to lifelong learning")
_____ 8 Service/citizenship ("share responsibility both for their communities and for the world")

***Comments regarding program goals and alignment with institutional and Essential Studies goals:***
*In the 2012 Assessment Plan, the department explicitly aligns a series of undergraduate mathematics courses with Quantitative Reasoning. The senior capstone course is aligned with Critical Thinking and Communication.*

**2. ASSESSMENT METHODS**

Were any specific assessment methods referenced? YES_X___ NO____ QUALIFIED Y/N ____

- If so, were specifically chosen assessment methods appropriately aligned with individual goals? YES__X___ NO____ QUALIFIED Y/N ____
- Were both direct and indirect assessment methods used as components of a "multiple measures" approach? YES__X___ NO____ QUALIFIED Y/N ____

***Comments:***
*According to the 2012 Assessment Plan, the Department collects data from students who are enrolled in a variety of courses such as Set Theory and Logic, and the Senior Capstone. More specifically, they collect samples of student solutions to exam problems. However, some of the listed assessment methods are vague (e.g., "Instructors of the Senior Capstone will provide samples of student work that calls for students to demonstrate their appreciation for the inherent beauty of mathematics"), and we would like to know more about the elements that are included. All methods are aligned with student learning goals.*

*Assessment methods used to measure the Essential Studies goals are varied. To measure quantitative reasoning, assessment methods include the use of embedded questions on midterm and final exams, course success rates, and student opinion data gleaned from course evaluations. To measure communication and critical thinking, students write a term paper and deliver a presentation. The faculty evaluate the paper and the presentation component of this assignment.*

**3. ASSESSMENT RESULTS**

| | | | |
|---|---|---|---|
| Were any assessment results reported? | YES_X__ | NO____ | QUALIFIED Y/N ____ |
| • If so, were the results clear in terms of how they specifically affirm achievement of goals? | YES____ | NO____ | QUALIFIED Y/N _X___ |
| • If so, were the results clear in terms of how they indicate need for improvement? | YES____ | NO____ | QUALIFIED Y/N _X___ |
| • Were the results tied to goals for student learning? | YES____ | NO____ | QUALIFIED Y/N _X___ |

***Comments:***
*As noted in previous reviews, the Mathematics department uses a three year cycle to assess undergraduate student learning. Each student learning goal is assessed at least once every three years. The FY13 Annual Report indicates that student learning in two areas was assessed in spring 2013: [students will] develop an appreciation for the importance of proof in mathematics, knowledge of what constitutes a mathematical proof, and the ability to understand and construct elementary proofs (Goal 2) and; [students will] develop an appreciation for the central role that examples play in mathematics (Goal 3). Although no specific results were reported, the department indicated that they collected instructors' reports on student learning that related to the two goals. No additional detail was provided.*

*Results of a comprehensive student assessment of learning in the capstone seminar were reported in the FY13 Annual Report. The Department provided student scores on a Calculus I word problem, student scores on a take-home quiz on limits, and student scores on a homework set on integration skills to assess Goal 1 ("every mathematics major will be proficient in the elementary computational techniques … taught in Precalculus and Calculus"). They scored student responses on a geometric proof as well as student responses to a quiz about using mathematical induction to prove a statement to assess Goal 2 ("every mathematics major will develop an appreciation for the importance of proof in mathematics, knowledge of what constitutes a mathematical proof, and the ability to understand and construct elementary proofs"). The Department reported the results of faculty review of student responses to essays to assess Goal 4 ("every mathematics major will develop an awareness of the broad applicability of mathematics and be exposed to some areas of mathematics that are obviously applicable"), Goal 5 ("every mathematics major will develop an appreciation for the beauty of mathematics as an independent discipline and be exposed to some areas of mathematics that are not obviously applicable"), and Goal 6 ("every mathematics major will develop an appreciation for the complexity and subtlety of mathematics"). Goal 3 ("every mathematics major will develop an appreciation for the central role that examples play in mathematics") was not assessed for the capstone seminar.*

In addition to program goals, some assessment results may be applicable to institutional and Essential Studies goals. Indicate any goals for which the program presents findings, and, for indicated items, describe findings below.

___X____ 1 Communication – written or oral ("able to write and speak in various settings with a sense of purpose/audience")
___X____ 2 Thinking and reasoning – critical thinking (or "be intellectually curious"; analyze, synthesize, evaluate)
_____ 3 Thinking and reasoning – creative thinking (or "be intellectually creative"; explore, discover, engage)
___X____ 4 Thinking and reasoning – quantitative reasoning ("apply empirical data…analyze graphical information")
_____ 5 Information literacy ("be able to access and evaluate…for effective, efficient, and ethical use")
_____ 6 Diversity ("demonstrate understanding of diversity and use that understanding…")
_____ 7 Lifelong learning ("commit themselves to lifelong learning")
_____ 8 Service/citizenship ("share responsibility both for their communities and for the world")

***Comments regarding results and the application of results to program, institutional, and Essential Studies goals:***
*Data are collected to assess student learning for the Essential Studies goals at the time of revalidation. Data were collected from students in five courses to assess student learning related to specific Essential Studies goals in 2012-2013. The results are included in the FY13 Annual Report. Two courses received designation as Essential Studies "Q" courses in 2012-2013: Math 105 (Trigonometry) and Math 115 (Introduction to Mathematical Thought). Results reported included course success rates and student opinion data from course evaluations. The Department reported results of faculty scoring of embedded exam questions in two courses (Math 165 – Calculus I, Math 166 – Calculus II) to determine that the goal related to critical thinking was being met. Finally, results from student performance in the senior capstone were reported to determine that the Essential Studies goals of quantitative reasoning and advanced communication were being met. The reported results included faculty review of student coursework and faculty review of student portfolios. In addition, student data from course evaluations was provided to indicate the extent to which students felt that the senior capstone improved their learning in critical thinking (M=3.61), quantitative reasoning (M=3.50), written communication (M=3.67), and oral communication (M=3.44).*

**4. CLOSING THE LOOP**

Were any actions taken on the basis of assessment results reported? YES___X____ NO____ QUALIFIED Y/N ____

- If so, do curricular or other improvements/ changes arising from assessment results directly address goals for student learning? YES___X____ NO____ QUALIFIED Y/N ____

***Comments:***

*The FY13 Annual Report included a discussion of changes that were made to the senior capstone, such as adjusting the due dates of papers and problem sets, decreasing the number of outlines that students submit for the presentation from two to one, and shortening the length of the presentations.*

**SUMMARY**

| ***Strengths*** | ***Areas for Improvement*** |
|---|---|
| _**X**__ A specific plan for assessment is in place. | ____ No specific plan for assessment is in place. |
| **____** Student learning goals are well-articulated. | ____ Student learning goals are not well-articulated. |
| ____ Assessment methods are clearly described. | ____ Assessment methods are not clearly described. |
| _**X**__ Assessment methods are appropriately selected. | ____ Assessment methods are not appropriately selected. |
| ____ Assessment methods are well-implemented. | ____ Assessment methods are not well-implemented. |
| _**X**__Direct and indirect methods are implemented. | ____ A single type of assessment methods predominates. |
| _**X**__Results are reported. | ____ No results are reported. |
| ___ Results are tied to closing the loop. (Decision-making is tied to evidence.) | ____ Results are not clearly tied to closing the loop. (Decision-making is not directly tied to evidence.) |

## OVERALL SUMMARY AND RECOMMENDATIONS:

*The Mathematics Department has clear and well-defined assessment plan in place for the undergraduate program. There are student learning goals, although the language is a bit vague in some of them. There are assessment methods in place, and the Department does align the methods with the stated student learning goals. Moreover, results were reported for the majority of the student learning goals, and specifically for the Essential Studies goals.*

**MATERIALS REVIEWED**

| | |
|---|---|
| __X___ Annual report | __X___ Assessment plan (as posted) |
| _____ Appendices (cited in annual report) | __X___ Previous assessment review |
| _____ Other (please describe) | |


| Reviewer(s): | Name | Bradley Myers | Deborah Worley | Kyle Thorson |
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Section 1: __Y___ Section 2: __Y___ Section 3: __Y___ Section 4: __Y___

Coding Key:

- Y = yes, this is done appropriately and well (bearing in mind the kind of program(s) reviewed and recognizing that assessment is a cyclical process, i.e., with additional kinds of data to be collected and analyzed in other years)
- Q = qualified yes as action or progress is apparent; however, evidence is lacking that this is completely and appropriately done

N = no, this is not done at all, or it is not done in relationship to student learning
NA = no information reported and it's unclear whether it was done

*Revision 9/25/13*

**UNIVERSITY ASSESSMENT COMMITTEE**
**Feedback to Academic Departments on Assessment Activities Reported in __FY13____ Annual Reports**
**GRADUATE PROGRAMS**

**DEPARTMENT_____Mathematics_____DATE___April 14, 2014_____**

**PROGRAM(S) COVERED IN REVIEW _____MS, MEd_____**

**COMMITTEE MEMBER(S) CONDUCTING REVIEW Deborah Worley, Bradley Myers, Kyle Thorson**

**1. STUDENT LEARNING GOALS**

- Were any goals referenced? YES__X__ NO___ QUALIFIED Y/N ___
- If so, were goals well-articulated? YES____ NO____ QUALIFIED Y/N _X__
- Do goals address student learning? YES__X__ NO___ QUALIFIED Y/N ___

***Comments:***
*The 2012 Assessment Plan includes student learning goals which state that students will:*

- *1a: Develop an understanding of at least two areas of modern mathematics (MS)*
- *1b: Develop an understanding of at least one area of modern mathematics as well as an understanding of the teaching and learning of mathematics (MEd)*
- *2: Develop the ability to independently learn significant mathematics, and to communicate what they learn to others (MS and MEd)*

*Even though the goals address student learning, the wording of the goals is vague, leading to difficulty for reviewers to determine what specific aspects of student learning are assessed.*

**2. ASSESSMENT METHODS**

Were any specific assessment methods referenced? YES_X___ NO____ QUALIFIED Y/N ____

- If so, were specifically chosen assessment methods appropriately aligned with individual goals? YES__X___ NO____ QUALIFIED Y/N ____
- Were both direct and indirect assessment methods used as components of a "multiple measures" approach? YES_____ NO__X__ QUALIFIED Y/N ____

***Comments:***
*There are two methods of assessment mentioned in the 2012 Assessment Plan: review of comprehensive exam scores and review of the independent study or thesis. These reviews are conducted annually. Review of comprehensive exam scores are used to assess student learning on goal 1a and 1b. The review of the independent study or thesis is used to assess student learning on goal 2. A sample rubric for scoring independent study presentations was included in the FY13 Annual Report. No further detail was provided.*

**3. ASSESSMENT RESULTS**

Were any assessment results reported? YES__X__ NO____ QUALIFIED Y/N ____

- If so, were the results clear in terms of how they specifically affirm achievement of goals? YES____ NO____ QUALIFIED Y/N _X___
- If so, were the results clear in terms of how they indicate need for improvement? YES____ NO__X__ QUALIFIED Y/N ___
- Were the results tied to goals for student learning? YES____ NO____ QUALIFIED Y/N __X__

***Comments:***
*In the FY13 Annual Report, the Department reported assessment results for two MS students. There were no MEd students. For the MS students, the assessment result that was reported for goal 1a merely indicated that the students "passed comprehensive exams in two areas". No further detail or data was provided. For goal 2, the Department reported the average scores on the independent study presentations for the two MS students. No further detail or data was provided.*

**4. CLOSING THE LOOP**

Were any actions taken on the basis of assessment results reported? YES_____ NO__X__ QUALIFIED Y/N ____

- If so, do curricular or other improvements/ changes arising from assessment results directly address goals for student learning? YES_____ NO____ QUALIFIED Y/N ____

***Comments:***
*The FY13 Annual Report included no mention of actions taken by the Department on the basis of assessment results reported.*

**SUMMARY**

| ***Strengths*** | ***Areas for Improvement*** |
|---|---|
| _X___ A specific plan for assessment is in place. | ____ No specific plan for assessment is in place. |
| ____Student learning goals are well-articulated. | ____ Student learning goals are not well-articulated. |
| ____Assessment methods are clearly described. | ____ Assessment methods are not clearly described. |
| ____Assessment methods are appropriately selected. | ____ Assessment methods are not appropriately selected. |
| ____Assessment methods are well-implemented. | ____ Assessment methods are not well-implemented. |
| ____Direct and indirect methods are implemented. | ____ A single type of assessment methods predominates. |
| ____Results are reported. | ____ No results are reported. |
| ____Results are tied to closing the loop. (Decision-making is tied to evidence.) | _X___ Results are not clearly tied to closing the loop. (Decision-making is not directly tied to evidence.) |

## OVERALL SUMMARY AND RECOMMENDATIONS:

*It is clear that the Department has an assessment plan in place for graduate programs. However, the student learning goals lack specificity thus making it difficult to determine what aspects of student learning are actually being assessed. There are assessment methods in place, and the Department does align the methods with the stated student learning goals. Again, however, the description of the assessment methods used is vague, as is the reporting of results and it is difficult to know what students actually learn. The use of the rubric to assess the independent study or thesis is a step in the right direction of adding detail to the assessment methods that are implemented, but it would be helpful to add additional methods so that the Department does not rely solely on faculty perception when assessing student learning. Finally, we encourage the Department to think critically about the data that are collected and to report any changes that occurred or actions that were taken within the graduate programs, and to tie those changes or actions to assessment results.*

**MATERIALS REVIEWED**

| | |
|---|---|
| __X___ Annual report | __X___ Assessment plan (as posted) |
| _____ Appendices (cited in annual report) | __X___ Previous assessment review |
| _____ Other (please describe) | |

| Reviewer(s): | | | | |
|---|---|---|---|---|
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Section 1: __Q___ Section 2: __Q___ Section 3: __Q___ Section 4: __N___

Coding Key:

- Y = yes, this is done appropriately and well (bearing in mind the kind of program(s) reviewed and recognizing that assessment is a cyclical process, i.e., with additional kinds of data to be collected in other years)
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