

## Assessment Trends Report Student Learning Outcomes in Mathematics

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The goal of this report is to evaluate the assessment of student learning outcomes in Mathematics. The report addresses four key questions to evaluate the quality of our assessment processes.

### (1) How have we sustained the assessment effort over a multi-year period of time?

How many years have you completed an annual assessment report?

2006     2007     2008     2009

The assessment reports for the Department of Mathematics and Computer Sciences have been prepared by Dan Miller every year that the data has been collected. The data is collected as appropriate in each class, depending on the type of artifact, and then compiled and analyzed by each individual faculty member, who then sends his or her results to Dr. Miller. The entire department shares responsibility for evaluating, modifying, and continuing to improve the assessment process, with a clear culture of assessment evident across the board.

### (2) How do we systematically and comprehensively collect and analyze data about student learning?

The learning goals for Applied Math and Math Ed majors are:

An applied mathematics major will

1. be able to integrate and differentiate functions,
2. be able to express and interpret mathematical relationships from numerical, graphical and symbolic points of view,
3. be able to read and construct mathematical proofs in analysis and algebra, and
4. be able to apply mathematics to at least two areas taken from biology, physics, chemistry, economics or computer science.

A mathematics education major will

1. be able to pass the Illinois high school mathematics certification exam,
2. know in broad terms the history of calculus, algebra, and probability,
3. have prepared at least 2 lesson plans in mathematics, and
4. have served as a teaching intern for a member of the mathematics faculty

The Math department collects data in a variety of ways:

- Use of final grades in Calculus I, II, and III, Discrete Mathematics, Differential Equations, and Numerical Analysis (Applied Math – all four goals)
- Scores on the state certification exam (Math Ed – goal 1)
- Use of final grades in Math History (Math Ed – goal 2)
- Assessment of student-generated lesson plans (Math Ed – goal 3)
- Student reflection on teaching internships (Math Ed - goal 4)

The department regularly reviews exams and course content from each of the courses listed above to ensure that passage of those courses is equivalent to meeting the learning goals. The data is collected for all majors, and as such is clearly comprehensive.

	Student Learning Outcome 1	Student Learning Outcome 2	Student Learning Outcome 3	Student Learning Outcome 4
AY 2006-07	GREEN	GREEN	GREEN	GREEN
AY 2007-08	GREEN	GREEN	GREEN	GREEN
AY 2008-09	GREEN	GREEN	GREEN	GREEN

### (3) How do we use the analysis to improve curriculum and pedagogy and to inform decisions about budgets and strategic priorities?

The reports are not discussed by the department as a whole in a formal sense, but there is a well-established continuous conversation between departmental members about student learning, and issues that are raised by

assessment are handled through one-on-one or small group discussions. Each report is emailed to the Dean of Teaching and Learning and posted on the Millikin University web page.

For both the Applied Mathematics and Mathematical Education majors, the student learning outcomes have been rated as green in all categories for all years for which there is data. This evidence of high achievement by students in these programs is not an indication that the faculty rest on their laurels and continue teaching exactly the same things in the same way. For example, while 100% of the math education students have passed the state teacher certification exam, a deeper analysis of the results of that exam revealed that, in general, the students had a weakness in their understanding of statistics. As a result, the department changed graduation requirements for those students, requiring a more rigorous curriculum in statistics, and the students have shown a corresponding improvement on the state exam. The department has also changed scheduling and the ordering of their classes, in order to better sequence material and improve performance in upper-division classes. To specifically address learning goal (c) for the Applied Math majors, they began requiring Abstract Algebra for all majors, a course which heavily stresses proofs. To specifically address learning goal (b) for the Mathematics Education majors, the department began requiring History of Math for all Math Ed students.

**(4) How do we evaluate, modify, and continue to improve the student learning assessment process in this program?**

The assessment process in Mathematics has stayed the same over the time period covered here. Their system is informal, and it predates (by many years) the university-wide emphasis on assessment. There are numerous curricular and pedagogical reforms that can be directly tied to assessment, as well as a continuous reinforcement of what works, demonstrating a clearly closed loop within their assessment process.

**Evaluation from Focus Visit Leadership Team (includes Academic Deans, Program Leaders, and Focus Visit Report Writers)**

**Rating: Green**

Academic program	Goal 1 (multi-year)	Goal 2 (data collection)	Goal 3 (Use assessment to improve)	Goal 4 (improve assessment)	Total
<b>Mathematics</b>	3	3	3	3	12

Based on the four questions/criteria, the Focus Visit Leadership Team rates the Department of Mathematics as Green. It is clear that the faculty in the Department of Mathematics are systematically and comprehensively collecting and analyzing data concerning student learning, and they are using their analysis to validate the effectiveness of their curriculum and pedagogy.