

Indiana University Kokomo
B.A. in Mathematics
Assessment Report AY 2007-2008

I. Brief Summary of Assessment Plan

Student Learning Outcomes Assessed During AY 2007 – 2008

The specific student learning outcomes that were assessed for AY 2007 – 2008 and their performance criteria are as follows.

Goal 3, Outcome 1. Students will be able to perform algorithmic and logical procedures to solve computational problems.

This was assessed in M215 (Fall 2007), M311 (Fall 2007), and M216 (Spring 2008).

Goal 3, Outcome 2. Students will be able to perform algorithmic and logical procedures to construct proofs.

This was assessed in M303 (Spring 2008), M347 (Spring 2008), M403 (Fall 2007), and M404 (Spring 2008).

The performance criteria for each of these learning outcomes are shown in the table below.

Outcome	Components	Performance Criteria
3.1. Perform algorithmic and logical procedures to solve computational problems		Level I: Makes many or serious errors performing algorithmic computations. Level II: May make some errors when performing some algorithmic computations. Level III: Makes few and very minor errors performing algorithmic computations.
3.2. Perform algorithmic and logical procedures to construct proofs		Level I: Can complete only very simple proofs. Level II: Can perform some less simple proofs, but may have difficulty with some more complex proofs. Level III: Can consistently complete more complex proofs.

Benchmark Used:

The benchmark for acceptable student performance is as follows. For courses with an enrollment of 10 or more students an acceptable level of performance will be achieved if, using the performance criteria for the assessed outcome, 90% of students who earn a grade of C- or better in the course perform at level II or above. For courses with an enrollment of less than 10 students an acceptable level of performance will be achieved if, using the performance criteria for the assessed outcome, 80% of students who earn a grade of C- or better in the course perform at level II or above.

Changes to the plan:

The assessment plan for AY 2007-2008 originally called for the assessment of three learning outcomes. However it was decided that it would be appropriate to assess student work for no more than two outcomes each year and this year we collected and reviewed assessment data for the two outcomes listed above.

II. Assessment Methods.

Student performance with regard to the outcomes being assessed were made by reviewing a selection of relevant problems taken from the final exams of M215, M216, M311, M303, M347, M403 and M404. In addition one student took the Mathematics General Examination, and that exam was carefully reviewed as part of the assessment process.

Portfolio materials of student work in all the above mathematics classes were collected throughout the academic year. The portfolio materials for a course include, as a minimum, each student's final examination. If the faculty member teaching a course is concerned that the final exam will not provide sufficient examples of student work for assessment purposes, additional work such as graded homework, midterm tests, and major projects, is also included in the portfolio. Although our benchmarks refer only to those students who earn a grade of C- or better, all students' work is assessed regardless of their final grade in the course.

The faculty met in mid October to begin the assessment review for the 2007-2008 academic year. To assess student achievement, the portfolio materials were permuted among the faculty, so that in addition to the original course instructor having graded the work, another faculty member also closely reviewed the work pertaining to the outcomes being assessed. Thus, when a final assessment of student learning was made, all student work that was assessed had been thoroughly reviewed by at least two faculty members. Each faculty member kept detailed notes of their assessment of students' work and evaluated it in regard to the performance criteria. After reviewing all the work the faculty met again to compare notes and reach a consensus on a level of performance for each student in each course, based on the performance criteria for the learning outcome assessed. The same procedure was used for assessing the work in the Mathematics General Examination, except that all three tenured mathematics faculty reviewed each question on that exam. At this time the results of the assessment were thoroughly discussed, along with any possible implications for the program.

III. Assessment Results:

Goal 3, Outcome 1. Students will be able to perform algorithmic and logical procedures to solve computational problems.

This learning outcome was assessed by looking at student work from in M215 (Fall 2007), M311 (Fall 2007), and M216 (Spring 2008).

Outcome	Performance Levels Achieved			
Perform algorithmic and logical procedures to solve computational problems.		M215	M216	M311
	Level I	8	1	0
	Level II	4	2	2
	Level III	0	2	3
	Overall Percent at Level II or III	33%	80%	100%
	C- or better Percent at Level II or III	100%	100%	100%

The benchmark for acceptable student performance for courses with an enrollment of 10 or more students is that an acceptable level of performance will be achieved if, using the performance criteria for the assessed outcome, 90% of students who earn a grade of C- or better in the course perform at level II or above. This level of student performance was achieved in M215. The benchmark for courses with less than 10 students enrolled is that at least 80% of the students who earn a grade of C- or better, perform at level II or above. This was achieved in both M216 and M311.

Goal 3, Outcome 2. Students will be able to perform algorithmic and logical procedures to construct proofs.

This learning outcome was assessed by looking at student work from M303 (Spring 2008), M347 (Spring 2008), M403 (Fall 2007), and M404 (Spring 2008).

Outcome	Performance Levels Achieved				
Perform algorithmic and logical procedures to solve construct proofs.		M303	M347	M403	M404
	Level I	2	1	0	0
	Level II	2	3	3	2
	Level III	2	0	0	0
	Overall Percent at At Level II or III	67%	75%	100%	100%
	C- or better Percent at At Level II or III	100%	100%	100%	100%

The benchmark for courses with less than 10 students enrolled is that at least 80% of the students who earn a grade of C- or better, perform at level II or above. This benchmark was achieved in all four courses.

In evaluating the work in the Mathematics General Examination, all questions on the exam were reviewed. It was determined that the learning goals addressed by the exam questions were

Goal 1. Understand the nature of truth and the concept of proof in the discipline of mathematics.

1. Students will be able to construct and write proofs for mathematical assertions, using a variety of methods.

Fifty percent of the Mathematics General Examination consisted of problems that involved writing proofs. The one student who took this test was consistently able to complete proofs, making only a few minor errors, and was determined to have performed at Level III (the highest level).

Goal 3. Formulate and solve problems mathematically.

1. Students will be able to perform algorithmic and logical procedures to solve computational problems.

Fifty percent of the Mathematics General Examination consisted of problems that involved solving computational problems. The one student who took this test made only a few minor errors, and was determined to have performed at Level III (the highest level).

Goal 4. Communicate mathematical ideas clearly and effectively.

1. Students will be able to explain the solutions to problems using correct mathematical vocabulary and mathematical notation.

Every question on the exam required that the student be able to communicate clearly using correct mathematical vocabulary and mathematical notation. The examination showed that the student was consistently able to do this, and was so the student was judged to have performed at Level III (the highest level).

IV. Using Assessment for Program Improvement

The assessment results and performance levels achieved were in line with what is to be expected.

At this time the assessment results for the learning outcomes assessed do not indicate that any curriculum changes are necessary.

In the course of this year's assessment of the mathematics major the mathematics faculty discussed the mathematics general examination dating back nearly twenty years. Our experience

has been that students take the four week open book take-home examination very seriously and prepare carefully for it. A few students have expressed some concern about whether coursework taken elsewhere would adequately prepare them for the test. However only two students have failed the exam on their first attempt and in both cases these were non-traditional students who had taken significant breaks in their education and had some mathematics transfer credit from other colleges. The difficulties seemed to stem from recalling the material that had not been seen for some time, or had not been learned in coursework taken at Indiana University Kokomo. Both students concerned later went on to successfully complete the general examination at the second attempt. The Mathematics General Examination is accomplishing what it set out to do, by providing a capstone experience which requires students to draw on the mathematics learned over the course of their entire degree program and giving students the opportunity to demonstrate that they have acquired broad range of mathematical knowledge.

V. Dissemination of Results:

A summary of this assessment report will be posted on the NIMS assessment website.