

Student Outcomes Assessment: The Mathematics Major

The Department of Mathematics and Computer Science has completed the first round of student outcomes assessment for the major in mathematics. Rather than doing a longitudinal study, we gathered data on the students currently enrolled in the program, since it and the faculty teaching in it have not changed in the last four years. We also surveyed the mathematics majors who have graduated in the last ten years. Our assessment process involved multiple assessment measures of the beginning, middle and end of the major. However, given the small number of students and graduates involved, it is impossible to do any meaningful statistical analysis of the data. Nonetheless, it is possible to draw some conclusions from the data gathered which are presented in this report along with the data gathered.

Our Goals for the Program and for Assessment

The department adopted the following three goals for the mathematics major, each goal having specific components.

1. **Interface between the real world and mathematics**

Analyzing, understanding, and translating a real world problem into mathematical symbology – interpreting the mathematical conclusions in terms of real world situations – evaluating the reasonableness of the mathematical results.

2. **Problem solving skills and computation**

Acquire the knowledge and tools from different areas of mathematics – analysis (calculus and differential equations), discrete mathematics, algebra, probability and statistics that can be used to solve a variety of problems. Be able to identify effective methods for solving a given problem and implement them. Once the computations are accomplished the student should be able to use his or her knowledge to check the validity of the results.

3. **Appreciation of mathematical rigor and precision**

The student should be able to determine the validity of a given argument from a given set of rules of inference and a given set of definitions and axioms. Moreover the student should be able to develop such a valid argument.

We gathered data in order to answer the following assessment questions.

- Q1. Are the students entering the program academically prepared to begin work toward meeting the program goals?
- Q2. Are the program goals in alignment with entering students personal goals?

- Q3. Is the grading in our courses indicative of how well the students are progressing in meeting the program goals?
- Q4. Do our mathematics majors who have graduated find our goals relevant to their current and future career?
- Q5. What suggestions do our current students and graduates have for improving the program?

Assessment of the Beginning of the Program

In order to answer Q1 we analyzed the high school transcripts and COMPASS placement of the six freshmen and sophomores currently enrolled as mathematics majors. Two did not have high school transcripts available. All of the others had taken through calculus in high school and were placed into trigonometry by COMPASS. Of the five for whom high school rank was available, four ranked in the upper 10% of their class. This data suggests that the students entering as mathematics majors at ISU are well prepared academically to begin our program.

We also surveyed these six students as to how well prepared they were to meet the various components of our goals when they arrived at ISU and also how important these components are to their personal goals in pursuing a mathematics major. In addition we asked what their goals are and ways of improving the program. Three students returned the survey. The results suggest that the students agree that the department's goals are important to their personal goals, but are unsure as to how well prepared they are. A copy of the Freshman/Sophomore Survey, the responses to it, and the comments received are included with this report.

Assessment of the Middle of the Program

We sent a survey similar to the Freshman/Sophomore Survey to the thirteen current juniors and seniors in the program to determine how they perceived their progress toward meeting the program goals and the importance of these goals to their future careers. No surveys were returned to the department in spite of repeated requests from us. We cannot analyze an empty data set, but we would expect that students would be willing to voice deep dissatisfaction through an anonymous survey. We include a copy of this survey with our report.

We also endeavored to answer Q3 by applying the enclosed Assessment Rubric to three problems on the Math 132 (Calculus II) final exam and two problems on the Math 380 (Introduction to Abstract Mathematics) final exam and seeing how well the results correlate with the course grade. The assessment was done by a faculty member other than the course instructor and was done without the assessor knowing who the student was, what his/her course grade was, or how the instructor had graded the problems. The data suggest that course grades align with the progress students are making towards meeting our program goals, although not as well in Math 380 as in Math 132. We include a copy of the rubric used as well as the data from Math 132 and Math 380.

Assessment of the End of the Program

The department sent out surveys to the 61 alumni who graduated with a mathematics major in the last ten years for whom the Alumni Office had an address. Two were returned by the Post Office as undeliverable. We received thirteen completed surveys. From the completed surveys we can conclude that our graduates are happy with the education they received from us, they are confident in their mathematical skills and capabilities, and that our program goals align well with their own career goals. We have included a copy of the survey sent to the graduates along with their responses and comments. Many of the completed surveys included suggestions for improving the program.

Summary

Overall, our students and graduates are happy with the current mathematics major program and its goals. We will continue to gather data and refine our Student Outcomes Assessment Process so that we can be sure that this will continue to be so. Some of our graduates suggested on their survey that we should add more statistics or applied mathematics to the program. The department is currently discussing adding both a statistics track and an applied track to the mathematics major.

