

**PLAN FOR ASSESSING STUDENT LEARNING OUTCOMES  
2008-2009**

**Discipline/Program: Mathematics**

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**1. Summarize in three or four sentences the result of your outcomes assessment for 2007-2008.**

Based on the results of many semesters of departmental, cumulative final exams, it was clear that most Math 090 students were not meeting Math 090 Objective #2: Solve a formula for a given variable. The math department's 2007-2008 assessment plan focused on developing and implementing remediation strategies with the year-end goal: At least 50% of all Math 090 students will correctly solve a final exam problem assessing Objective #2. Several promising remediation strategies were implemented, and both objective and subjective assessments were used throughout the Spring 08 semester. The end result, however, was that only 48% of Math 090 students correctly solved the final exam problem.

**2. Given these results, what changes are you implementing in 2008-2009? How will you assess the effectiveness of these changes?**

Math department faculty feel strongly that the remediation strategies that were developed (and documented) can be successful. While only 48% of Math 090 students correctly solved the Objective #2 problem, we are comforted by the fact another 27% of students (75% in all) demonstrated a good understanding of the problem. (More details are available upon request.)

Throughout the 2008-2009 academic year, Math 090 faculty will again implement the remediation strategies that were developed. Math 090 students will be assessed on Objective #2 by using at least one final exam problem on each of the fall and spring exams. In addition, we have revised our Objective #2 goal: At least 50% of all students **who obtain a C or better in Math 090** will correctly solve a final exam problem assessing Objective #2. The change in the goal reflects our belief that only passing students can be expected to meet the course objectives.

**3. If you are launching a new assessment project in 2008-2009, describe the student learning outcome(s) you plan to assess. Identify the course(s) in which the outcome(s) will be assessed.**

For the 2008-2009 academic year, the math department will broaden the scope of its assessment plan. Math faculty are especially interested in the institutional goal of ensuring that our students develop effective problem solving/critical thinking skills. With this institutional goal in mind, the math department's assessment plan will focus on:

- Math 090 – General Objective<sup>1</sup> #2 – Apply various techniques to solve linear, polynomial, and rational equations.

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<sup>1</sup> By general objective we mean a course objective taken from the official course outline. Many math courses have specific objectives that refine and elaborate on the general objectives.

- Math 095 – General Objective #1 – Apply various techniques to solve linear, quadratic, absolute value, rational, and radical equations and inequalities.

At least twelve of the specific Math 090 and Math 095 objectives relate to these general objectives. Based on the results of many years of cumulative, departmental final exams, it is clear that our students are not meeting our expectations with regard to these objectives. (See attachment: Math Faculty Expectations.)

We would like to understand why students have failed to master these objectives and to determine what level of proficiency our students obtain. While the proficiency levels will be refined over the next 6 six months, we will use Polya's four steps as a starting point:

- 1) Understand the problem
- 2) Devise a plan
- 3) Carry out the plan
- 4) Look back

Our year-end goal is: At least 75% of students who receive a C or better in Math 090 or Math 095 will reach or surpass the middle of level 3.

The following is a tentative schedule for the activities associated with this assessment plan:

#### Fall 2008

- Full-time faculty refine proficiency levels
- Faculty develop trial versions of the free-response portions for Math 090/095 final exams designed to assess our students' levels of mastery
- Administer final exams

#### Spring 2009

- Faculty analyze final exams
- Department chair reports to all Math 090/095 instructors
- Faculty focus groups consisting of full- and part-time faculty will meet to discuss faculty perceptions of student difficulties
- Faculty facilitate student focus groups where students will discuss their perceptions of their own difficulties<sup>2</sup>
- Proficiency levels are refined
- Faculty develop free-response portions for Math 090/095 final exams designed to assess our students' levels of mastery
- Administer final exams

#### Fall 2009

- Department chair reports to faculty and administration
- Faculty develop remediation strategies, if necessary

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<sup>2</sup> Ideally, the student focus groups will help math faculty better understand students' difficulties with the math content. We believe that this may help us design better assessment instruments, and it may lead to the development of promising remediation strategies.

**Important note:** An unrelated, but very important, additional piece of our assessment plan is that we will begin to develop a system whereby we can track our students as they move from one math course to another. Ideally, we would like final exam scores for Math 085/090/095/151 students to become part of their permanent records, and we would like to be able to easily access this data for statistical analysis.

**4. How is this assessment related to your findings for 2007-2008?**

The math department's 2008-2009 assessment plan broadens the scope of the 2007-2008 plan. The Math 090 specific objective that was assessed last year falls under the Math 090 general objective being assessed this year. While the department is happy with the remediation strategies that were developed last year, our earlier assessment showed us what students cannot do, but failed to show us what they can do. This year's plan should help us pinpoint the levels at which our students are performing.

**5. How many sections of the course(s) will be assessed? How many students?**

All sections of Math 090 and Math 095 will be assessed by using cumulative, departmental final exams. For each course, a free-response portion of the final exam will be designed to specifically address our assessment plan. Other multiple choice problems throughout the final exams will also assess the objectives. In all, approximately 600 students will be involved in the plan. A random sample of the free-response work will be analyzed by full-time math faculty.

**6. What data will you collect?**

The most important data that will be collected are the results of the free-response portions of the Math 090/095 final exams. Full-time faculty will analyze this data with the goal of determining what level of proficiency our students obtained. An items analysis of the multiple choice portions of the final exams will also be carried out.

**7. How will your adjunct faculty be involved in this assessment?**

Adjunct faculty will be involved in a number of ways:

- a. Adjunct faculty with experience in teaching Math 090/095 will be invited to participate in the faculty focus groups.
- b. Experienced adjunct faculty will be invited to help full-time faculty refine the proficiency levels.
- c. All Math 090/095 faculty will give common, departmental final exams.
- d. Throughout the project, the department chair will report to all Math 090/095 faculty.
- e. When developed, remediation strategies will be shared with all faculty.

**8. Do you have a need for any specialized data that is not provided as part of the annual program review process? If so, identify your needs.**

The bulk of the current assessment plan requires no specialized data. However, the additional piece of the assessment plan referred to at the bottom of Part 3 will require the development of a

system whereby final exam scores can become part of student histories. Student grades and final exams scores must eventually be provided for the purpose of student tracking and statistical analysis.

**9. How will this data be analyzed? Do you have any specialized tools for analysis (e.g. rubrics, standards)?**

In order to analyze the results of the departmental final exams, the four proficiency levels must be refined and rubrics for placing students into levels must be developed. These tools will be developed during the Fall 2008 and Spring 2009 semesters.

**10. Do you need any support or assistance to complete this project?**

Referring to Part 8, we will need the help of the MIS department to review the capabilities of the Datatel system and develop an effective tracking system.

**Provide your dean with both an electronic copy and a hard copy of this completed form by November 14, 2008.**

## Math Faculty Expectations

For over a decade, math faculty teaching Math 085, 090, 095, and 151 have given common, cumulative final exams during the fall and spring semesters. Each problem on each final exam is designed to assess a specific course objective. Our expectation has been that 50% of all students taking the final exam will solve each problem correctly. If our expectation is not met, the corresponding objective is flagged<sup>3</sup>. The next semester, faculty work to improve student performance on the objective. Of course, we expect our remediation efforts to be successful. However, semester after semester, many of the same objectives are consistently flagged.

After a number of discussions, the department has revised its expectation of student performance. We now expect that at least 50% of all students **who obtain a C or better in Math 090** will correctly solve each final exam problem. The revision is based on the fact that we expect passing students to meet the course objectives, but we do not necessarily expect failing students to do so.

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<sup>3</sup> Quite often the corresponding final exam problem is also flagged and analyzed for possible revision.