UW Colleges Assessment Planning and Reporting Form 2004-2005

Email your reports to **SAC@uwc.edu**

Department	Mathematics
Assessment Coordinator(s)	Paul Martin and Colleen Vachuska

NOTE: Please attach relevant supporting information used to complete the Report Summary Sheet.

PART 1: Assessment of General Education Outcomes

Section 1: Identify the Proficiencies and Performance Indicators Assessed

- at the *Planning* stage, mark the performance indicators to be assessed in the left hand column below
- at the *Reporting* stage, report the numbers of students who did not meet, met, or exceeded expectations

	Proficiency	Performance Indicators	# Do Not Meet	# Meet	# Exceed
X	**B. Quantitative Skills**	1. Solve quantitative and mathematical problems	762	1504	824

Section 3: Use of Results

1. How did individual instructors report that they plan to use these results to improve the instructional process?

Instructors mainly noted where their students performed poorly and expressed a variety of measures they would take to help students understand these topics better.

At a June 2004 meeting, instructors came up with specific plans to improve instruction in their classes. These plans have been shared with all the department members and are included below.

Project abstracts submitted by participants at the end of the Math Workshop on June 8/9, 2004

Clare Hemenway/Chris Capista

Project: Introduction of Logarithms into Math 105 after Exponentials

Why? At the conference, one of the recurring problems for students in Math 110 is logarithms and exponentials. It is hoped that an introduction to the topic in Math 105 may mitigate some of the initial difficulties encountered by the students.

Implementation: After simplifying exponential expressions using the laws of exponents (integer exponents), we will have the students consider some equations involving exponential expressions (this follows a practice used in our text for other topics, ie, simplifying rational expressions and then solving equations containing rational expressions).

Example 1: Consider the equation $3^x = 81$. What does it mean to find a solution to this equation? What would be the solution to this equation?

Give more equations like the following (a few in class, then a worksheet)

$2^x = 32$

$3^x = \frac{1}{9}$

$5^x = 25$

$10^x = 1$

What about something like the following

$10^x = 140$

$2^x = 13$

How do we think about the solutions to these types of equations? You do not know the answer to these equations (the answers are not integers), but we can still ask these questions. The mathematical notation that is used to denote the solution is

$x = \log_{10} 140$

$x = \log_2 13$

These expressions are called *logarithms* and then the instructors will explain how these expressions are read. In particular, we will emphasize the terminology log ***base*** 10 (refer back to the corresponding exponential equation where the ***base*** is also 10).

Go back to the beginning examples and ask the students to write those equations as a solution in x and from there to write them as logarithms.

Example 2:

$\log_4 64 = x$ is equivalent to $4^x = 64$

A second worksheet could then be introduced where the students will be asked to do the reverse; that is, change from logarithms to exponential notation.

The ultimate goal is to get the students to see the relationship between what they have learned regarding exponents, and the notation of *logarithms.*

Tom Peneski
Writing for the Conceptual Understanding

Students have basic difficulty understanding the meaning of definitions and the symbolism that is behind the concept. Frequently there are several interpretations to similar looking expressions or formulas. Algebra expressions, function notation, representations of ideas get confusing. Describing inequalities in a meaningful manner and correctly, learning that function notation and algebraic notations can be overlapping and confusing, and the meaning of symbols may or may not have meaning log = 4. Other situations might apply to the abuse of the “equals” sign.

The idea of writing for conceptual understanding is have the student write one or two sentences describing their understanding of a mathematical expression, equation, a nonsense conjunction of symbols, or solutions.

I hope to have weekly writing exercises for the students to do. Initially, I will share with the class what others have written. From discussions in class maybe better understanding of the concept can occur. Students will be asked to complete sentences on quizzes and exams. Nothing more is planned other

than to get students to think about the meaning of expressions, function notation and the interplay of representations. Hopefully, this should guide their learning when solving problems.

June 9, 2004

Fall 2004 Project
Getting to know the new instructional technology, ALEKS

Youn, Eun-Jung
Assistant Professor
University of Wisconsin – Fond du Lac

During the spring 2003, I taught Math 110 and had a hard time to find the right level for all students. There were about 5-10% quite smart students who were ready and willing to learn as much as I intended to. However most of students didn't have enough previous knowledge to learn new materials in Math 110. I taught the concepts which are supposed to be introduced in this class, but they couldn't follow my lecture so well. When I went slow, smart students got bored. So if I made speed up a little, then about a half of the whole class looked overwhelmed and puzzled. I have been wondering if there would be a way to resolve this problem.

In the Math Dept Assessment and Curriculum Workshop Summer 2003, a web-based computer program, named ALEKS, were introduced and it might be a good thing to try in the first place. I got to know that an account in the ALEKS system has been given to me as an instructor. So I am planning to play with and get used to it first until I get confidence on implementing this new program on my class. First, I would give some useful information from ALEKS to the class and see how my students would think and react to it. Also I would give some assignment that students hand in their work typed in word documents, since I found that it's quite similar to type in the ALEKS. I am not quite sure how much I could do with ALEKS and how much students follow my project. But it's worth to know how to use a math program which helps students to understand the materials individually depending on their backgrounds. If I come down to the decision on using it in my class, I would start with free trials for students in Math 110 (or Math 105) during spring 2004 and see how it goes.

My project for a fall semester

Meg Onoda

I have learned about ALEKS through out the workshop and would like to be able to utilize ALEKS in my class, possibly for a spring semester. So, my goal is to study ALEKS and organize my lesson plans to help me prepared for a course (105 or 110) with ALEKS in spring semester.
In addition, I would like to be familiar with Scientific Notebook.
I believe ALEKS can help my students to get more involved with mathematics activities. In a usual class setting, (in which I am very comfortable with), it is very hard to know how much time they are spending on their homework or reviewing for the test, etc. But using ALEKS, it appears to me that I can monitor my students better and find out how they are doing in a course. I think my students are going to enjoy ALEKS.
Before I introduce ALEKS to my students, I have to be very familiar with it and master it so that I will be comfortable using ALEKS in my class and be ready for any questions my students might have regarding ALEKS.
So, my project for a fall semester is to study ALEKS to start using it for a next spring semester. I will also put my lesson plans in order so that it will correspond to ALEKS activities. This is going to be very different from my usual class but constructing new class setting is something that needs to be done in order to improve my student's math skills.
I usually use WORD to type up my extra handouts or exams but being able to use Scientific Notebook will be beneficial too. I enjoy trying out new things and ALEKS will be a good teaching tool for my classes.

Jim Marty
I wish to get well versed on using ALECKS in 105 during the fall and 110 in the spring.

In the spring, I plan to do some work in 110 using "computer" notation rather than "mathematical" notation for functions.

i.e., SQRT(x) for square root of x

SQ(x) for square of x
LOG(x) for log x
LN(x) for ln x
EXP(x) for e^x
EXP(x) for 10^x
not sure how to incorporate bases but maybe I can use base 10 and then wean the students into the notation of the book

Jim Marty

Roger Peterson

My projector assocuiated with the workshop is to produce a series of extremely short group drill problems for MAT 105 that will be used in class immediately following the introduction of the topic. The intent will be to jump start them on further drill work with assigned problems.

A Sample List of Topics:

1.Laws of Integer Exponents.
2.Solving Equations By Factoring.
3.Adding and Subtracting Algebraic Fractions.
4.Solving Equations Involving Algebraic Fractions.
5.Solving Quadratic Equations via the Quadratic Formula or Completing the Square.

Victoria Paaske

My project abstract is – introduce the notion of logarithms to both 091(5) classes and 105 classes.

For my 091(5) classes it may just only mean to mention to my students that every operation has an "opposite". Once students understand $2^3 = ?$, then mention if we should want to think in "reverse", to answer $2^? = 8$ mathematicians use language called logarithms or "log" for short and show them very few examples like $\log_2 8 = ?$ or just $\log_2 8$ and maybe only one or two more examples.

For my 105 classes it may mean to spend just slightly more time introducing this topic. Suggest there are properties related to this.

To see if any student understood this minimal introduction, I may put an extra credit problem on a test to check if the introduction made sense.

Project for fall, 2004. **David Schudson**

I want to motivate students to be more engaged our math class outside of class time without using force or bribery.

A) Encouraging visits to office hours by making the visits more personalized.
I will let the student do the work while I try to diagnose troubles, avoiding the stereotypical teacher whom upon learning that a student doesn't understand a concept, simply repeats the same thing in a louder voice.

B) Hypothesizing that students don't come to see me because they are embarrassed about a lack of understanding, I wish to create a list of names and e-mail addresses of students interested in an email support/study group. Since I would be excluded, students would be less inhibited. I don't mind that they might complain about me, because at least they would be engaged in the subject matter. I don't mind that some of the messages might contain less than perfect mathematics, because the inaccuracies would be revealed by the failure to reach a correct answer. Any difficulty that the entire group couldn't resolve could be brought to my attention by students buoyed by the fact that others

shared the same confusion. I've had success with study groups, but have had difficulty in getting students to take the time they require. Hopefully, email will be easier for them

Summer Math Workshop
June 9, 2004

Conceptual Questions for MAT 091
George Alexander

My proposed project abstract is to develop a series of short assignments to supplement student learning by asking for written answers to open ended conceptual questions. This is intended to help students in my ALEKS based MAT 091 course to draw connections between major topic areas and think more deeply about the computational skills they are learning in the elementary algebra course. My ALEKS course consists of five main topic areas (pie slices). I envision using perhaps two new questions for each of the five pie slices. Questions will require short (1-2 paragraph) answers.

MAT110 Project
Dick Oakland

My plan is to revise my instructions for small group exploration and discovery regarding transformations of functions and their graphs. The main objective of the revision is to remove or reduce the confusion between vertical stretching and horizontal compression.

When introducing shifts, there is nothing wrong with using a function like $y = x^2$, but something like $y = x^2 + x$ would be better for introducing the scaling transformations.

Abstract Enhance Student Learning in College Algebra starting 2004/5
Paul Martin, Isaac Solomon, Shubhangi Stalder, Peter Stonitsch

1. Select a common set of ALEKS topics to include in our Math 110 sections. (Full set appended below)
2. Design series of questions to promote conceptual understanding of topics in College Algebra and possible further application problems like above.
3. Add supplementary material in areas where ALEKS is inadequate, e.g. exponential growth and decay problems.
4. Share ideas on course syllabus, policies, and optimal use of ALEKS' features.

2. What recommendations would you and/or the department assessment committee make to your department for continued improvement of the assessment process, proficiencies, performance indicators, assessment activity, rubric, and/or student performance in the discipline?

   One item that has come up is there seems to be too much overlap of topic coverage in the 091-105-110 sequence of courses. We will ask the curriculum committee to try to tighten up what must be covered in each of these courses and try to eliminate some of the overlap so that some new topics can be covered.

   We may also look into giving some gate-way exams to insure a basic level of competency in skills needed for the subsequent course.

3. After discussion of the results by the department, what course of action will the department take to improve student performance with respect to the assessed proficiency?

   The mathematics department curriculum committee was charged with looking into decreasing the amount of overlap in the 091-105-110 sequence of courses and tightening up the course guidelines so there is less time spent on review. Also, the 3 or 4 credits for 105 should be looked at and perhaps made uniform across the colleges. We also suggest that College Algebra courses at a sample of the 4-yr campuses be looked at to see that we are in line with our transfer institutions on where we end up in 110.
   An ad-hoc committee was formed to look into setting up a sequence of short gate-way exams that cover the minimal content that is needed in the 091-110 courses for success in the next course. Students would need to pass some/all of these exams in order to pass the course. These exams could become the formal assessment tools for these courses. This committee will initially produce gateway exams for the 105 course.

PART 2: Assessment of Department-Specific Outcomes

Section 1: Identify department-specific outcomes/performance indicators.

Outcomes/Performance Indicators
1) Solve applied problems.
2) Solve equations.
3) Simplify or Evaluate Expressions.
4) Understand Graphical-Algebraic Representation of Concepts.
5) Awareness of and/or Use of Appropriate Resources.
6) Derivations, proofs, or verifications.

Section 2: Attach the rubric/standards used to assess each outcome/performance indicator.

Exceeds: Uses an appropriate method and carries out procedure with no mistakes.
Meets: Uses an appropriate method and applies it with only minor errors.
Fails: Uses inappropriate method or makes major errors.

Section 3: Assessment Results

Departmental Outcome/Performance Indicator	# Do Not Meet	# Meet	# Exceed
1. Solve Applied Problems.	762	1504	824
2. Solve Equations. *	1522	1269	1896

*The numbers above are counted for each equation type for each student. Most students were assessed on three equations and thus the number of students would be about a third of the numbers in row two. The numbers for the applied problems are from the institutional report where the counts correspond to students' overall performance on applied problems.

Section 5: Use of results

1. How did individual instructors report that they plan to use these results to improve the instructional process?

   Instructors mainly noted where their students performed poorly and expressed a variety of measures they would take to help students understand these topics better.

2. What recommendations would you and/or the department assessment committee make to your department for continued improvement of the assessment process, proficiencies, performance indicators, assessment activity, rubric, and/or student performance in the discipline?

   We have implemented uniform question pools for each course and placed these in the public folders where math department members have access to them. We have included in each pool the instructions for how to participate and report results for assessing that course. We also have appended bar-charts of historical performance on each question in the pools and an alert for typical areas that students have difficulty.

   We also distributed to each campus copies abstracts of interventions to improve many of these areas that were planned and implemented by faculty starting in June of 2004.

3. After discussion of the results by the department, what course of action will the department take to improve student performance with respect to the assessed proficiency?

   The mathematics department curriculum committee was charged with looking into decreasing the amount of overlap in the 091-105-110 sequence of courses and tightening up the course guidelines so there is less time spent on review. Also, the 3 or 4 credits for 105 should be looked at and perhaps made uniform across the colleges. We also suggest that College Algebra courses at a sample of the 4-yr campuses be looked at to see that we are in line with our transfer institutions on where we end up in 110.
   An ad-hoc committee was formed to look into setting up a sequence of short gate-way exams that cover the minimal content that is needed in the 091-110 courses for success in the next course. Students would need to pass these exams in order to pass the course. These exams could become the formal assessment tools for these courses. This committee will initially produce gateway exams for the 105 course.

   We are also continuing our ALEKS pilot study this Fall semester to compare this software based assessment/learning tool compared to traditional Math 110 sections.

   In an effort to address the objectivity of our rubric/assigning F/M/E, we plan to have a series of exams in several courses blindly graded by three instructors and evaluating how close the results match.

Most of the recommendations contained in our Final 2003/04 Plan/Reporting form have been acted upon.

We implemented ways to make the assessment activities and results more uniform across different sections. The assessment instructions and question pools and historical results for each problem are now combined into one file for each course. In the instructions to in these pools, attention is directed to question types where student performance has been less than we'd like.

The department has also set up an ad-hoc committee with representation from the assessment committee, and the curriculum committee to develop web-based randomly-generated gateway tests for Math 105. We will try to pilot these in spring 06.

PART 3: Additional Assessment and Contributions

Please ask for and include in the report information from Department members about any other assessment activities they have conducted, particularly in conjunction with grant-funded innovations. Also ask for and describe briefly any additional contributions to assessment such as publications, presentations, qualitative classroom innovations (such as Scholarship of Teaching and Learning activities), and other items relating to assessment that the department wishes to note.

The Mathematics Department has started a pilot study to evaluate the efficacy of using an on-line mathematics learning program (ALEKS). We are in the middle of a two – semester study comparing student performance using a variety of measures between the traditional and the ALEKS sections. There will be a full report of the results of this in Spring 06. Right now, we have instructors on about half of the UWC-campuses using ALEKS in one or more of the courses from 091-117.

As department assessment coordinator, I am not aware of our using assessment funds over the past two years. Our department assessment committee of four people has communicated frequently by email on developing question pools and soliciting input from department members and disseminating results and other information to the department. The math assessment committee meets three or four times a year to by teleconference to conduct business that requires more discussions. We did have a two-day assessment-related summer meeting in June of 2004, but I am not sure of the funding for this meeting.