Report on Student Learning Outcome Assessments

Mathematics, Statistics, and Engineering Division

2008-2009

Introduction

Faculty members of the Mathematics, Statistics, and Engineering Division have demonstrated their willingness to engage in the assessment of Student Learning Outcomes. During 2008-2009, assessments were conducted in 14 of 25 mathematics and statistics courses. A total of 61 of 138 course level SLOs were assessed, some multiple times. In fact 120 individual SLO assessments were conducted during this past year by 15 permanent and 6 part time instructors.

In the previous year, 8 permanent faculty members and 2 part time instructors completed SLO assessments in seven courses.

The results of the assessments are summarized in the table that follows. Much of the detail of the assessments does not appear in this summary but can be reviewed in the individual assessment documents provided by instructors. The recommendations that followed from the detailed analysis of student work include proposals to rebalance course content, change the pedagogical approach to topics, include more practice, improve the directions on test questions, and select new assessment questions that better align with the learning outcomes. These changes are intended to be included the next time the instructor teaches the assessed course. One should note, however, that instructors do not necessarily teach the same courses each semester, so is it possible that there is a lag between an assessment and the implementation of an action to improve student learning.

In the last two years I have provided a basic template for the faculty to report out the results of the assessment. I have been impressed by the quality and creativity of the reports that have been submitted. The richness and variability of the approaches will provide a basis for department discussions as we continue the process of assessing student learning.

Our goal is to complete the assessment of all student learning outcomes at the course level and program level, review the learning outcomes to be sure we've captured the essence of the courses and programs, and have a plan in place to ensure the process continues in an effective way.

	SLO Assessment Report		MSE Division	2008-2009		
Semester	Course	SLOs	Assessment	Analysis	Changes	Instructor
Spring 09	Math 27 Arithmetic	perform basic operations - subtraction with money	quiz	71% correctly simplified; $ omitted is incorrect answers	none	Gee
Spring 09	Math 27 Arithmetic	perform basic operations - subtraction without borrowing, with borrowing,long division with remainder	assigned in class	87% correct without borrowing; 80% correct with borrowing; 60% correct on long division with remainder	none	Gander
Spring 09	Math 27 Arithmetic	perform basic operations - multiplication	quiz	88% correct; errors in knowledge of multiplication facts	more review	Gee
Spring 09	Math 27 Arithmetic	perform basic operations - division	quiz	71% correct; errors in knowledge of division algorithm and addition mistakes	more time on division algorithm	Gee
Spring 09	Math 27 Arithmetic	perform basic operations; applications - geometry word problem	quiz	33% correct; errors due to concept of perimeter, wrong formula, notation, no understanding	include more visuals about perimeter and area; formula identification	Gee
Fall 08	Math 34 Pre-algebra	basic operations	final exam	Morning class: 70% correct; 61% correct with percentages. Evening class: 69% correct; 40% correct with percentages	increase practice on percentage problems	Lam
Fall 08	Math 34 Pre-algebra	basic operations - integers, fractions	final exam	integers: 72% correct; subtraction of integers accounted for most errors; fractions: 36% correct; common denominators, cancellation, signs, incorrect division	increase time on subtraction of signed numbers with paretheses; group activities with fractions; "focused" time with individual students on fraction arithmetic	Lambert
Sum 09	Math 34 Pre-algebra	basic operations	final exam	100% correct	none	Woodmansee
Fall 08	Math 34 Pre-algebra	apply order of operations	final exam	32% correct; subtracted before multiplying; multiplied before dividing; distributed incorrectly	review concepts; over-emphasize the left-to-right rule for multiplication and division	Lambert
Sum 09	Math 34 Pre-algebra	apply order of operations	final exam		none	Woodmansee
Fall 08	Math 34 Pre-algebra	simplify complex fractions	final exam	36% correct; simplified numerator and denominator ok; did not perform or correctly perform division	have students rewrite the problem using traditional division symbol as the first step	Lambert
Sum 09	Math 34 Pre-algebra	simplify complex fractions	final exam	100% correct	none	Woodmansee
Sum 09	Math 34 Pre-algebra	apply rules of exponents	final exam		improve directions on one Q	Woodmansee
Sum 09	Math 34 Pre-algebra	scientific notation	final exam	100% correct	none	Woodmansee
Sum 09	Math 34 Pre-algebra	square root	final exam	50% correct	increase class time; add group work component; make appropriate adjustments in other course content	Woodmansee
Fall 08	Math 34 Pre-algebra	apply appropriate techniques to solving linear equations	final exam	Morning class: 83% correct; 67% correctly solved equations with fractions. Evening class: 73% correct; 70% correctly solved equations with fractions.	Morning class: change instruction technique; Evening class: no change.	Lam

Fall 08	Math 34 Pre-algebra	apply appropriate techniques to solving linear equations - integers and decimals	final exam	84% correct with integers; 48% correct with decimals - more errors in addition	increase focus on equations with variables on both sides; review multiplication with decimals	Lambert
Sum 09	Math 34 Pre-algebra	apply appropriate techniques to solving linear equations	final exam	83% correct	none	Woodmansee
Fall 08	Math 34 Pre-algebra	translate into algebraic expressions and equations	final exam	48% correct; unclear about "twice" and "triple"	prepare study guide with English phrases and mathematical translation	Lambert
Fall 08	Math 34 Pre-algebra	apply algebraic methods to solve word problems	final exam	44% correct; missed identifying the variable; order of operations	emphasize defining the variable	Lambert
Sum 09	Math 34 Pre-algebra	apply algebraic methods to solve word problems	final exam	67% correct	not at this time	Woodmansee
Spring 09	Math 100 Elementary Algebra	demonstrate mastery in simplifying - apply rules of exponents	final exam	52% proficient	increase review prior to final	Harbison
Spring 09	Math 100 Elementary Algebra	demonstrate mastery in simplifying - apply rules of exponents; rational expressions; functions	final exam	80% correct; 50% correct; 100% correct;	replace exam question with more appropriate level of difficulty.	Woodmansee
Spring 09	Math 100 Elementary Algebra	classify polys and factor - factoring	review on 5 days followed by a quiz and midterm	74% quiz average; 59% midterm average suggests retention is the issue	encourage students to do more homework to help with retention	Mendez
Spring 09	Math 100 Elementary Algebra	classify polys and factor; solving word problems	final exam	50% correct on 4 questions; sum of cubes with GCF was widely missed	restructure test question to include GCF with difference of two squares	Woodmansee
Fall 08	Math 100 Elementary Algebra	classify polys and factor - factoring	final exam	79% - 92% successful	no change needed	Vrechek
Spring 09	Math 100 Elementary Algebra	apply appropriate solving techniques - rational, quadratic, radical equations	final exam	43% average on first 3; 35% average on radical equations	devote more time to solving radical equations	Larson
Spring 09	Math 100 Elementary Algebra	apply appropriate solving techniques - linear, quadratic, rational, radical equations, systems, inequalities	final exam	90% on 10 linear and quadratic equations: 67% on systems; 43% on radical equations; 0% on linear inequality systems	devote more time; adjust exam questions	Woodmansee
Fall 08	Math 100 Elementary Algebra	graphing lines	final exam	48% and 57% success	none	Manriquez
Spring 09	Math 100 Elementary Algebra	graphing	final exam	74% proficient	none	Harbison
Spring 09	Math 100 Elementary Algebra	graphing; slope and equations of lines	final exam	80% correct; 50% correct	not at this time	Woodmansee
Fall 08	Math 100 Elementary Algebra	word problems	final exam	30% and 46% success	include additional handouts and review of setting up problems	Manriquez
Spring 09	Math 100 Elementary Algebra	word problems	final exam	33% correct	this in spite of extra handouts and efforts to improve results	Woodmansee
Spring 09	Math 103 Elementary Algebra, I	basic operations - algebraic expressions	test and final exam	17% correct; 3% correct respectively. Subtraction errors; confusion about rules of exponents	emphasize memorization of rules of exponents; review subtraction of signed numbers	Lambert

Spring 09	Math 103 Elementary Algebra, I	basic operations - algebraic expressions	final exam	of 3 questions, average correct was 25%, 75%, and 25% respectively	no specific recommendation	Deglow
Spring 09	Math 103 Elementary Algebra, I	solving equations - linear, systems, inequalities	final exam	various percentages from 50% - 92% correct	additional worksheets for students	Deglow
Spring 09	Math 103 Elementary Algebra, I	solving equations - linear, systems	test and final exam	equation with integer coefficients 42% correct; with rational coefficients 16%; systems 39% and 48%	arithmetic errors abound	Lambert
Spring 09	Math 103 Elementary Algebra, I	graphing linear equations and inequalities	final exam	various percentages from 58% - 92% correct	additional worksheets for students	Deglow
Spring 09	Math 103 Elementary Algebra, I	graphing lines	final exam	53% success	none	Manriquez
Spring 09	Math 103 Elementary Algebra, I	word problems, system of equations	final exam	30% correct on sum of the parts problem; 13% correct on distance problem with currect	effort on setting up practice was evident; need to include classroom demonstration of wind problem	Lambert
Spring 09	Math 103 Elementary Algebra, I	word problems	final exam	various percentages from 75% - 92%	not at this time	Deglow
Spring 09	Math 103 Elementary Algebra, I	word problems	final exam	50% success	provide more review in class	Manriquez
Spring 09	Math 104 Elementary Algebra, II	basic operations - exponents	final exam	43% and 57% respectively	not at this time	Deglow
Spring 09	Math 104 Elementary Algebra, II	basic operations - simplifying radicals	final exam	18% success	none	Manriquez
Spring 09	Math 104 Elementary Algebra, II	polynomials - factoring	final exam	from 50% to 100% correct	not at this time	Deglow
Fall 08	Math 104 Elementary Algebra, II	polynomials - classification, factoring, embedded in rational expressions	final exam	89% success for classify and factor; 58% success within rational structure	none	van Warmerdam
Spring 09	Math 104 Elementary Algebra, II	polynomials - factoring	final exam	32% success	more handouts and review	Manriquez
Fall 08	Math 104 Elementary Algebra, II	solving equations - radical, quadratic	final exam	26% success on radical equation; 37% for quadratic	none	van Warmerdam
Spring 09	Math 104 Elementary Algebra, II	solving equations - linear, quadratic, radical, linear inequalities	final exam	various percentages with radical equations being most problematic	no	Deglow
Spring 09	Math 104 Elementary Algebra, II	graphing	final exam	various percentages from 29% to 93%	none	Deglow
Spring 09	Math 104 Elementary Algebra, II	word problems	final exam	50% - 64% success	none	Deglow
Spring 08	Math 110 Geometry	write a two-column direct proof	final exam	3 high; 3 medium; 5 low	2 day/week format is challenging; will review sooner	Vrechek
Fall 08	Math 110 Geometry	write a two-column direct proof	final exam	10 high; 5 medium; 6 low score	3 day/week class did better; begin review last 3 weeks of class	Vrechek
Fall 08	Math 120 Intermediate Algebra	solving equations - logarithmic	quiz	30% competent; lack of understanding of log function and notation	revise handouts; increase time on topic; create additional homework	Schutte
Fall 08	Math 120 Intermediate Algebra	solving equations - quadratic with complex solutions	final exam	68% competent; illegal reductions, negative under radical led to no solution; tried to factor	emphasize instructions and point out illegal reducing errors.	Handel

Fall 08	Math 120 Intermediate Algebra	solving equations - quadratic in form	final exam	2 correct; 6 nearly correct; 6 had no idea how to begin	have students create similar problems to improve their recognition of the type and understanding of the solution	Vrechek
Fall 08	Math 120 Intermediate Algebra	solving equations - linear, quadratic complex zeros, systems of non-linear, other	final exam	various percentages - 35%, 39% on quadratic, 30% on system	none	van Warmerdam
Fall 08	Math 120 Intermediate Algebra	solving equations - equations and equations of lines	first exam	74% success; 83% success	none at this time	Woodmansee
Spring 09	Math 120 Intermediate Algebra	Solving equations - exponential	quiz	92% success with same base; 69% success with different bases that could become the same; 54% success when definition of log had to be used	assign more problems to practice writing simple exponential equations in logarithmic form	Sholomytska
Spring 09	Math 120 Intermediate Algebra	Solving equations - linear, quadratic, quadratic complex zeros, systems both linear and non-linear, other	final exam	various percentages generally low	increase review time	Woodmansee
Spring 09	Math 120 Intermediate Algebra	solving equations - quadratic and systems	homework, test	60% correct with quadratic coef of 1; 40% correct with odd linear coef; 20% correct with quadratic coef not one. 79% successfully solved system	have students write the steps and refer to them when completing the square; no change for system	Van Sickle
Spring 09	Math 120 Intermediate Algebra	solving equations - radical	test	26% correct; 9% missed check for extraneous; 26% factoring error	process is understood - squaring errors, isolating radical also contributed to low success rate	Lambert
Spring 09	Math 120 Intermediate Algebra	solving inequalities - rational	test	2/22 correct; incorrect graphing of solution; multiplied by a potentially negative expression, distributed a negative incorrectly	ask class to identify ways to avoid similar mistakes. (This analysis included quiz, assess, test, reassess)	McDonald
Spring 09	Math 120 Intermediate Algebra	solving inequalities - absolute value	test	71% - 79% success	none	Van Sickle
Fall 08	Math 120 Intermediate Algebra	solving inequalities	first exam	69% success	none	Woodmansee
Spring 09	Math 120 Intermediate Algebra	solving inequalities	final exam	50% success	some organizational changes are planned	Woodmansee
Fall 08	Math 120 Intermediate Algebra	functions - definition; domain, range	final exam	65% and 57%	non	van Warmerdam
Fall 08	Math 120 Intermediate Algebra	functions - definition; domain, range	first exam	74%, 34% success	avoid vertical asymptotes when asking domain and range; make Q's more like text	Woodmansee
Spring 09	Math 120 Intermediate Algebra	functions - definition; domain, range	final exam	low percentages	organizational changes planned	Woodmansee
Fall 08	Math 120 Intermediate Algebra	graphing - exponential growth and decay, conics	final exam	22% and 78% respectively	none	van Warmerdam
Fall 08	Math 120 Intermediate Algebra	graphing - classify and graph	first exam	82% success	none	Woodmansee

Spring 09	Math 120 Intermediate Algebra	graphing - functions, conics, systems, transformatons	final exam	100% success on transformations; little success on other concepts	with rational graphs relocated along with conics, we should see some improvement here	Woodmansee
Fall 08	Math 120 Intermediate Algebra	word problems	final exam	30% success	none	van Warmerdam
Fall 08	Math 120 Intermediate Algebra	word problems	first exam	35% success	more time allocated in lecture and homework	Woodmansee
Spring 09	Math 120 Intermediate Algebra	modeling growth and decay	final exam	low success	lecture handout planned	Woodmansee
Spring 09	Math 334 Trigonometry	apply trig functions to angles and arcs	final exam	50% success	provide review packet	Woodmansee
Spring 09	Math 334 Trigonometry	evaluating trig functions	final exam	60% success	provide review packet	Woodmansee
Spring 09	Math 334 Trigonometry	trig identities	final exam	100% success	none	Woodmansee
Spring 08	Math 334 Trigonometry	trig identities	final exam	46% used identities accurately; 79% applied Laws of Sines and Cosines correctly	more practice	Gander
Fall 08	Math 334 Trigonometry	trig identities	final exam	40% used identities accurately; 63% applied Laws of Sines and Cosines correctly	more practice	Gander
Spring 09	Math 334 Trigonometry	trig identities	final exam	42% used identities accurately; 88% correctly applied Laws of Sines and Cosines.	more practice	Gander
Fall 08	Math 334 Trigonometry	trig identities	final exam	58%, 52% correctly solved problem using difference formulas; 35% correctly solved identity to value problem.	continue to develop memorization techniques	Lambert
Fall 08	Math 334 Trigonometry	solve trig equations	test and final exam	test results below 32%; exam results about 45%; algebraic errors dominated	improvement noted between test and final; have students watch their substitutions	Lambert
Spring 09	Math 334 Trigonometry	solve trig equations	final exam	50% success	final review packet	Woodmansee
Spring 09	Math 334 Trigonometry	graphing	final exam	25% success	adjust pacing chart to allow more time on this topic	Woodmansee
Spring 09	Math 334 Trigonometry	solve equations with complex numbers	final exam	low success	assessment was too difficult; make adjustments	Woodmansee
Spring 09	Math 334 Trigonometry	applications	final exam	60% success	final review packet	Woodmansee
Fall 08	Math 334 Trigonometry	applications - vectors and bearings; angle of elevation	test and final exam	23% to 29% test to final; 63% angle of elevation problem	improvement from last semester; reinforce calculator usage	Lambert
Fall 08	Math 342 Modern Busines Math	graphing - exponential and log fcns	final exam	86% success with exponential functions: 29% success with log functions	more examples and practice understanding relationship between log and exp fcns	Smith
Spring 09	Math 342 Modern Busines Math	linear programming - set up and solve	test in two classes	59% and 54% set up correctly; 41% and 46% solved correctly; incorrect inequality; constraints	more focus on set-up; key words for <, >	Lambert
Fall 08	Math 350 Life-Sciences Calc I	limits and continuity	exam	84% successful	none	Woodmansee
Fall 08	Math 350 Life-Sciences Calc I	derivatives	exam	89% success	none	Woodmansee
Fall 08	Math 350 Life-Sciences Calc I	curve sketching and optimization	exam	74% success	course adjustments	Woodmansee
Fall 08	Math 350 Life-Sciences Calc I	exponential, log, trig fcns; applications	exam	75% success	course adjustments	Woodmansee
Fall 08	Math 350 Life-Sciences Calc I	antiderivatives - areas and volumes	exam	88% success	topic is moving to 351	Woodmansee

Fall 08	Math 400 Calculus I	analytic geom, limits, derivative, integral concepts - derivative by def	final exam	13 of 17 correct; missed lim, didn't use def, algebra error	reinforce notation, rules of exponents, definition	A. May
Fall 08	Math 400 Calculus I	analytic geom, limits, derivative, integral concepts - limit w/abs val	final exam	5 of 24 completely correct; missed lim from left and right	allocate more time, emphasize lim from each side	Handel
Fall 08	Math 400 Calculus I	analytic geom, limits, derivative, integral concepts	final exam	100% success on limits; 50% on other concepts	none	Woodmansee
Fall 08	Math 400 Calculus I	calculate derivatives and integrals	final exam	88% success	none	Woodmansee
Spring 09	Math 400 Calculus I	calculate derivatives and integrals - der trans fcn	test	75% correct, 13% error, 8% blank, 4% skipped this one	review provided	Lambert
Fall 08	Math 400 Calculus I	applications	final exam	50% success	2/3 of class competent	Woodmansee
Spring 09	Math 400 Calculus I	applications - biology	test	29% correct; 25% small error	reinforce the "rate of change" concept and key words	Lambert
Fall 08	Math 400 Calculus I	proof	exam	low success	revise assessment	Woodmansee
Spring 09	Math 400 Calculus I	proof - hyperbolic fcn	test	46% correct; 13% partially correct	focus on pos/neg root; more familiarity with hyp fcns	Lambert
Spring 09	Math 401 Calculus II	integration techniques	test	88% success	none	Woodmansee
Spring 09	Math 401 Calculus II	applications of integration	test	80% success	none	Woodmansee
Spring 09	Math 401 Calculus II	parametric and polar	test	low success	increase time on this topic; reduce time on numerical methods	Woodmansee
Fall 08	Math 401 Calculus II	sequences and series - power series	quiz	5/24 correct; 2 missed radius of convergence; abs value inequality missed by half	review abs value inequalities and radius of convergence	Segal
Spring 09	Math 401 Calculus II	sequences and series	test	67% success	none	Woodmansee
Spring 09	Math 401 Calculus II	approximate functions as series	test	low success	revise instructions	Woodmansee
Sum 09	Stat 300 Statistics	summary data	final exam	100% success	none	Woodmansee
Fall 08	Stat 300 Statistics	probability	final exam - 2 class	73% and 74% success	none	Manriquez
Sum 09	Stat 300 Statistics	probability	final exam	80% success	none	Woodmansee
Sum 09	Stat 300 Statistics	confidence intervals	final exam	100% success	none	Woodmansee
Fall 08	Stat 300 Statistics	hypthesis tests	final exam - 2 class	55% and 33% success	more handouts and practice interpreting results	Manriquez
Sum 09	Stat 300 Statistics	hypthesis tests	final exam	71% success	emphasize labels on graphs	Woodmansee
Sum 09	Stat 300 Statistics	correlation and regression	final exam	100% success	none	Woodmansee
Sum 09	Stat 300 Statistics	use technology	final exam	81% success	none	Woodmansee
Spring 09	Stat 300 Statistics	applications	lab assignment	79% success	provide a checklist of required items in report	V. May
Sum 09	Stat 300 Statistics	applications - critical thiking	final exam	50% success	will search for better questions and provide extra work on this	Woodmansee